



# WATER DISSOCIATION



D



H<sub>2</sub>O



# WATER DISSOCIATION



**H<sub>2</sub>O**

**DISSOCIATION**

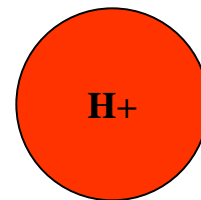
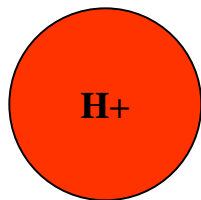
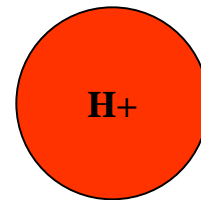
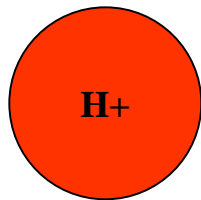
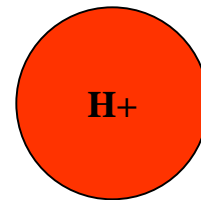
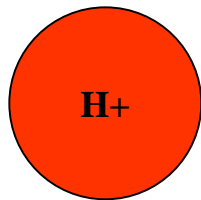




# WATER DISSOCIATION



0

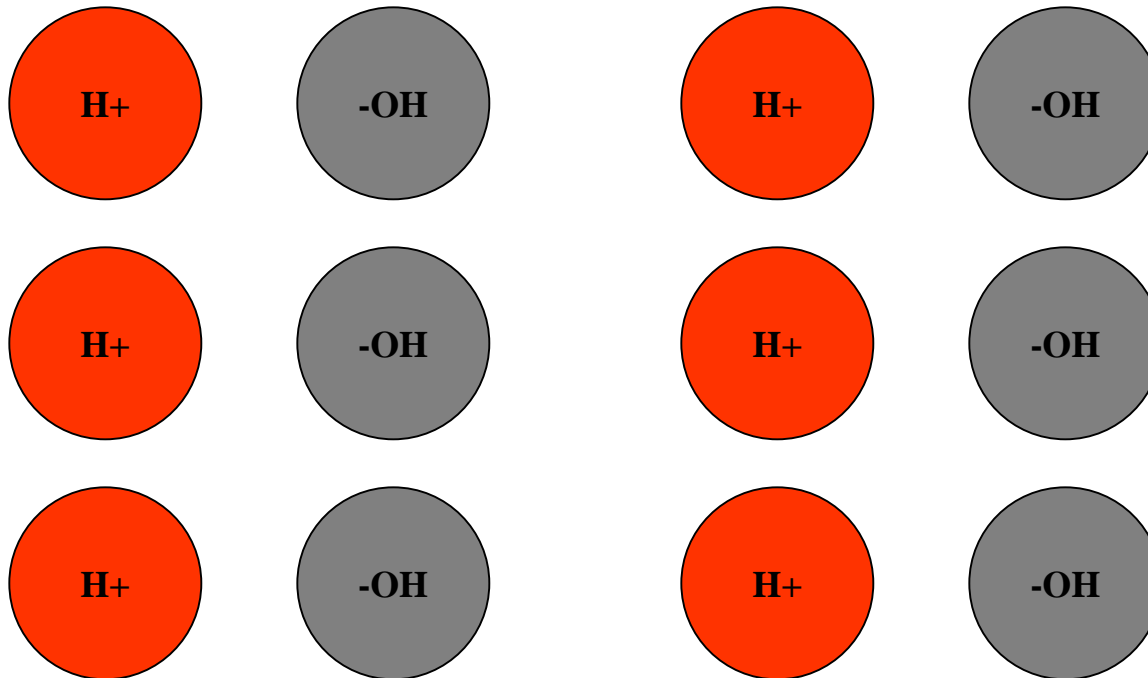
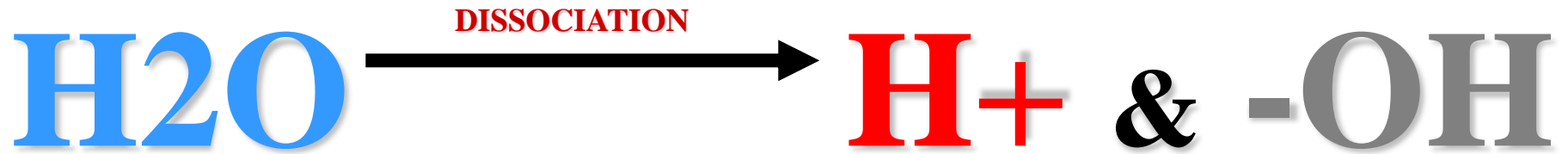




# WATER DISSOCIATION



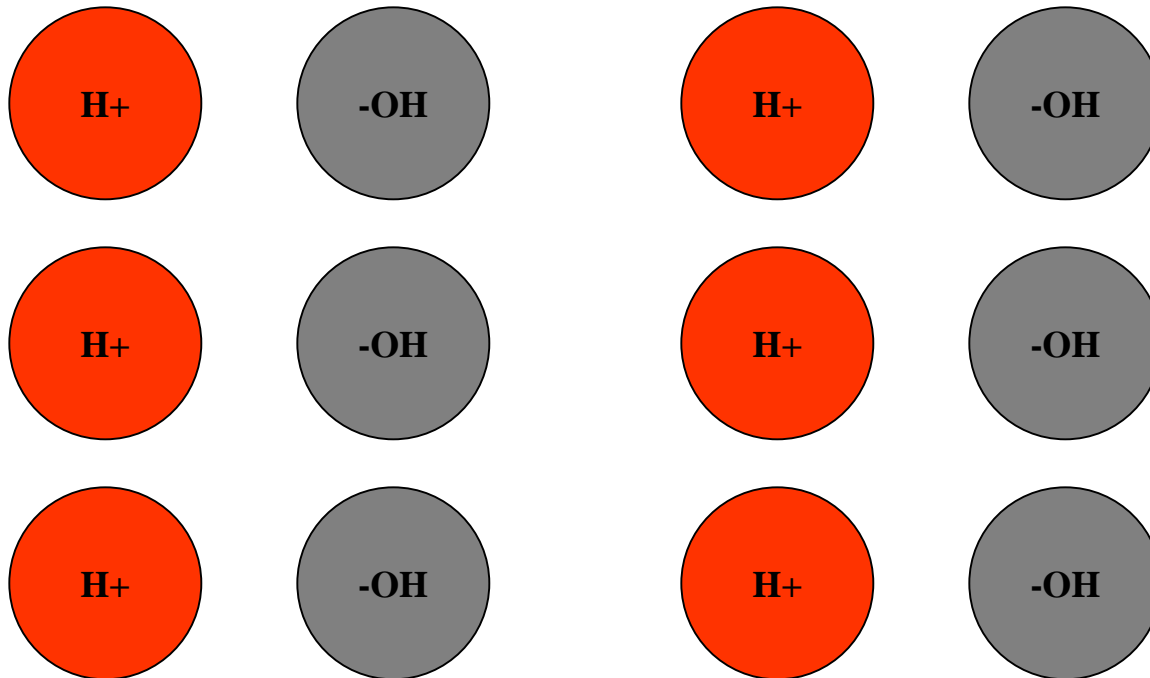
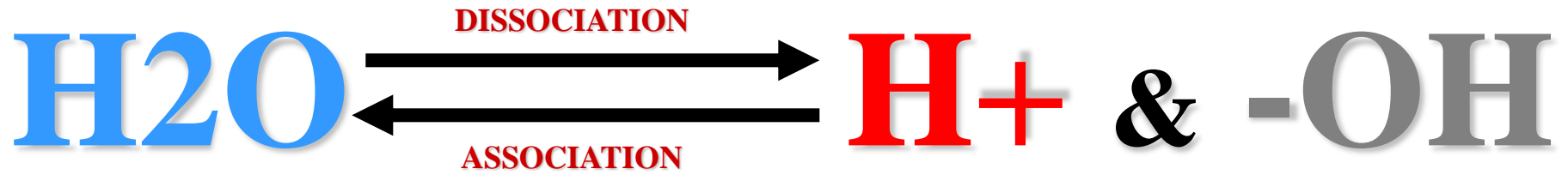
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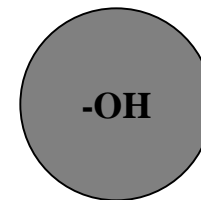
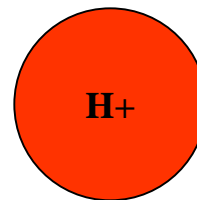
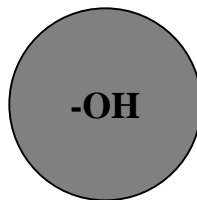
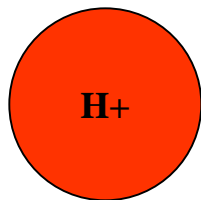
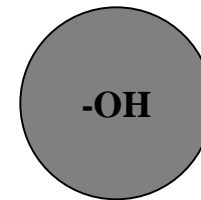
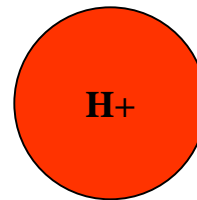
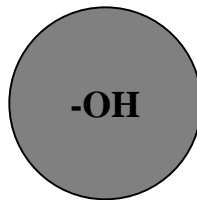
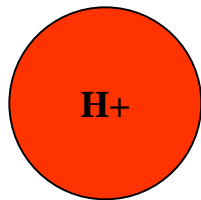
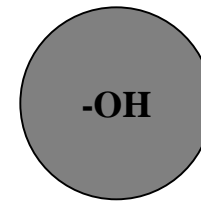
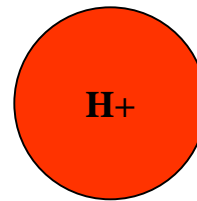
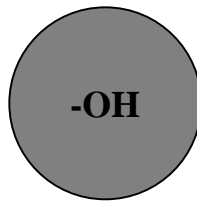
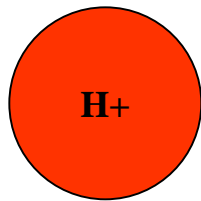
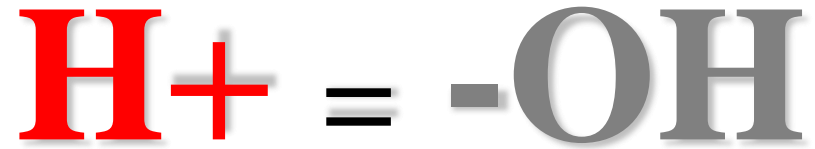
# WATER DISSOCIATION





# PURE WATER

NO SOLUTE





NO SOLUTE

**PURE WATER**

NO SOLUTE

# ACIDIC SOLUTION

# **ACIDIC SOLUTION**



# ACIDIC SOLUTION

HIGH  $H^+$  CONCENTRATION  
LOW  $OH^-$  CONCENTRATION

ACIDIC SOLUTION

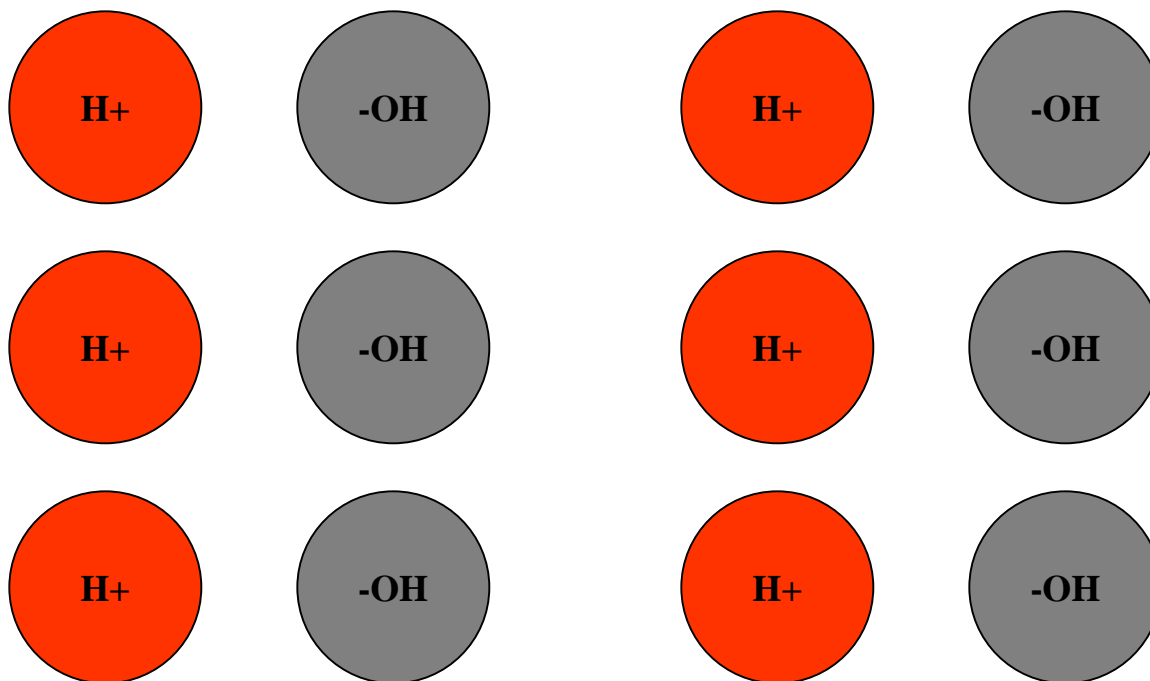


# AQUEOUS SOLUTION



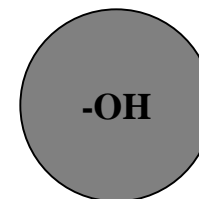
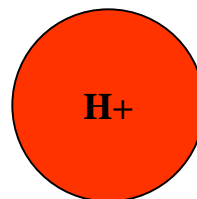
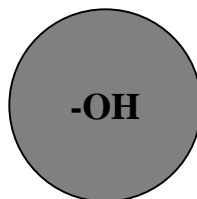
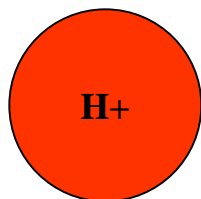
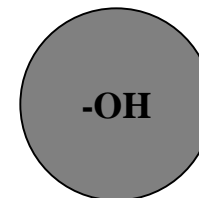
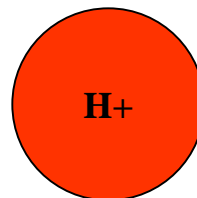
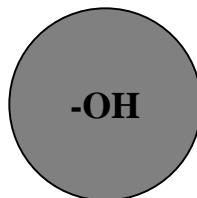
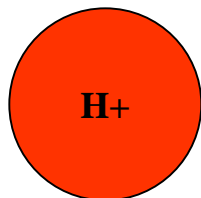
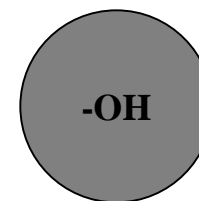
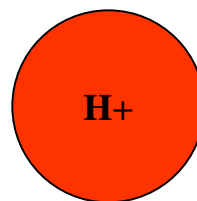
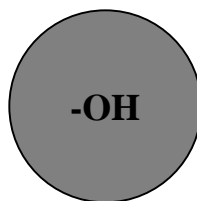
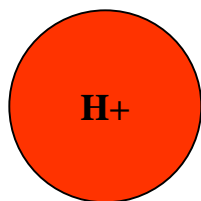
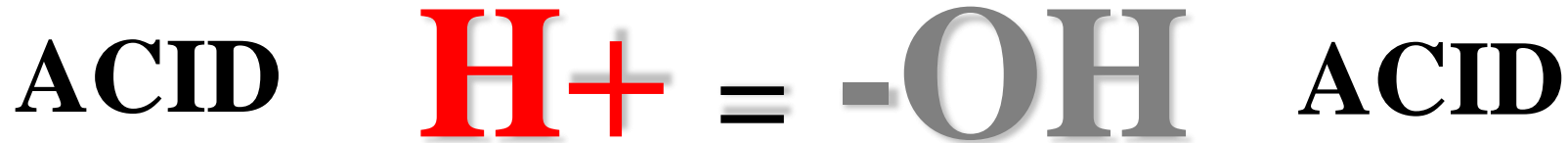
+

A





# AQUEOUS SOLUTION





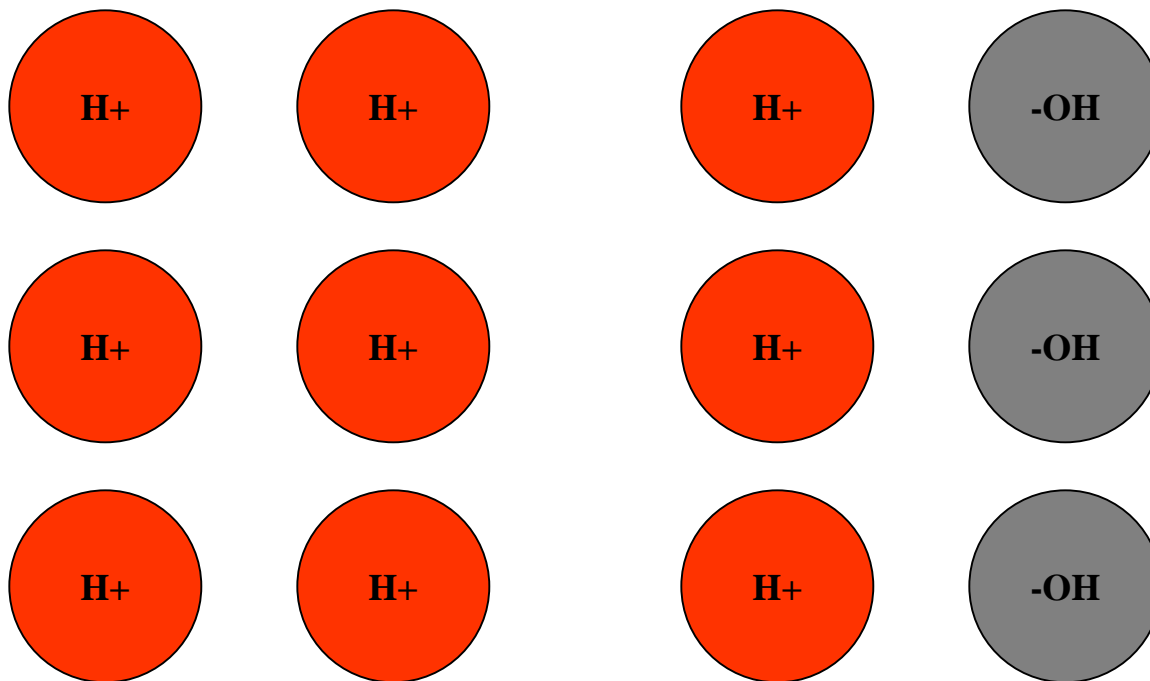


# AQUEOUS SOLUTION



AS

ACID  $H^+ > -OH$  ACID

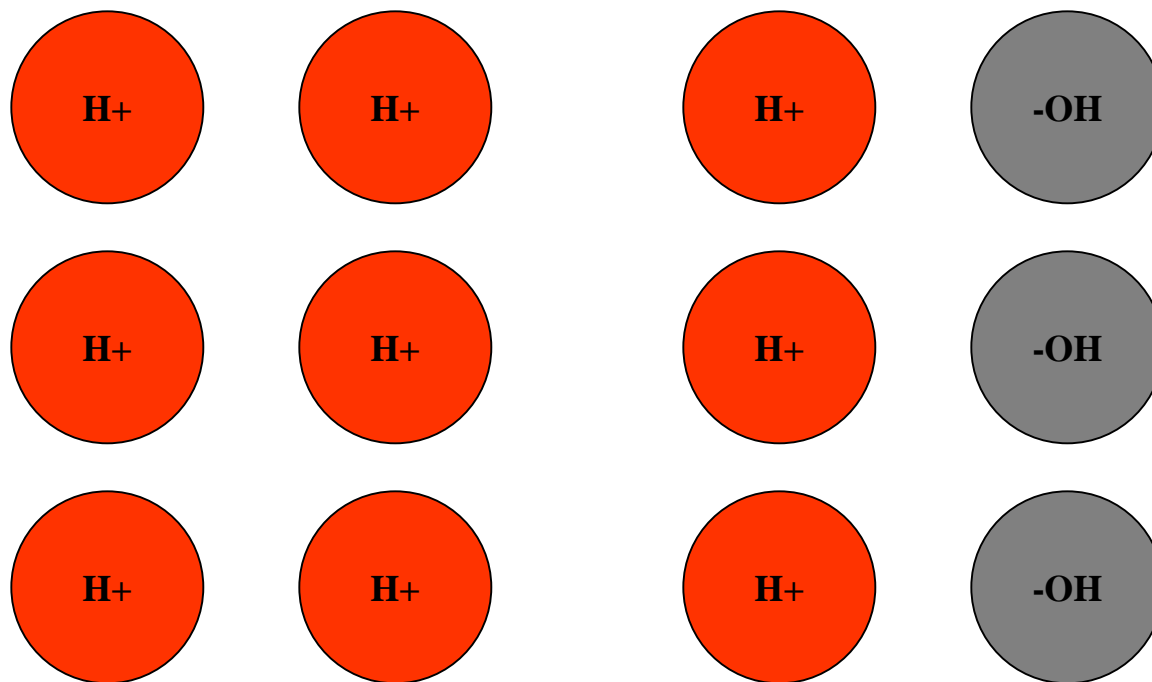




# ACIDIC SOLUTION



ACID **H<sup>+</sup>** > -OH ACID



# ACID

**ACID**

# ACID

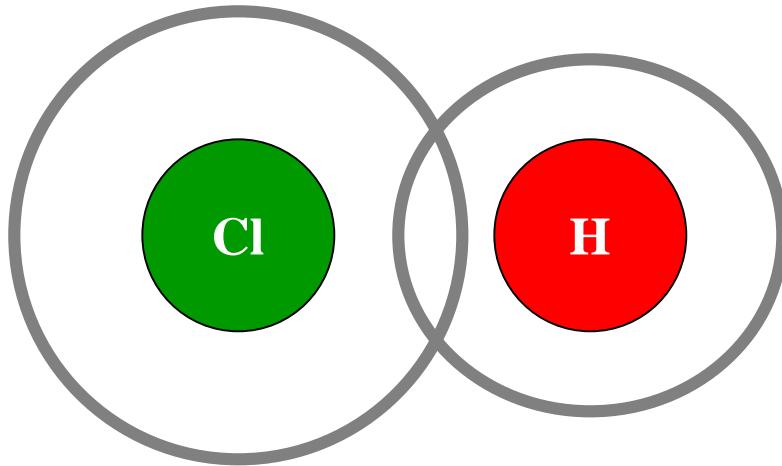
SOLUTE THAT INCREASES  
H<sup>+</sup> ION CONCENTRATION  
IN AN AQUEOUS SOLUTION

ACID

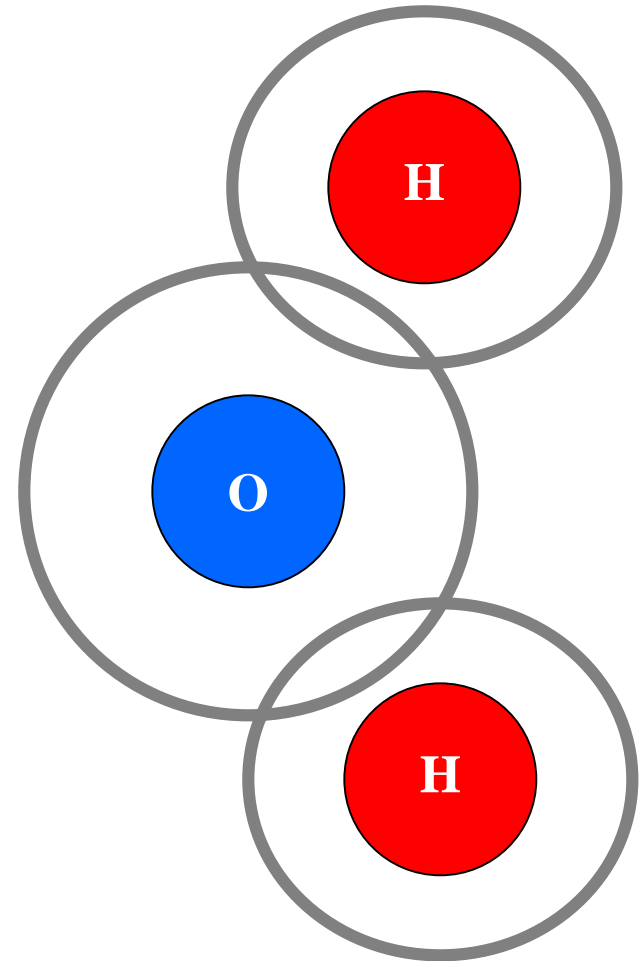


# ACID EXAMPLE

# HCL ACID DISSOCIATION

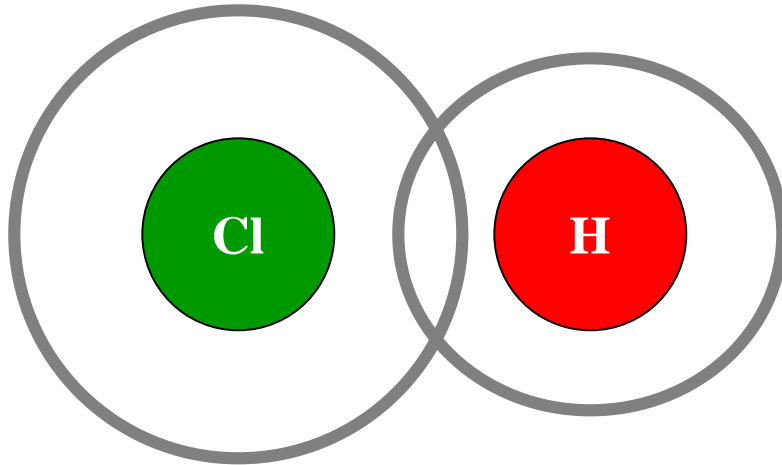


HCl

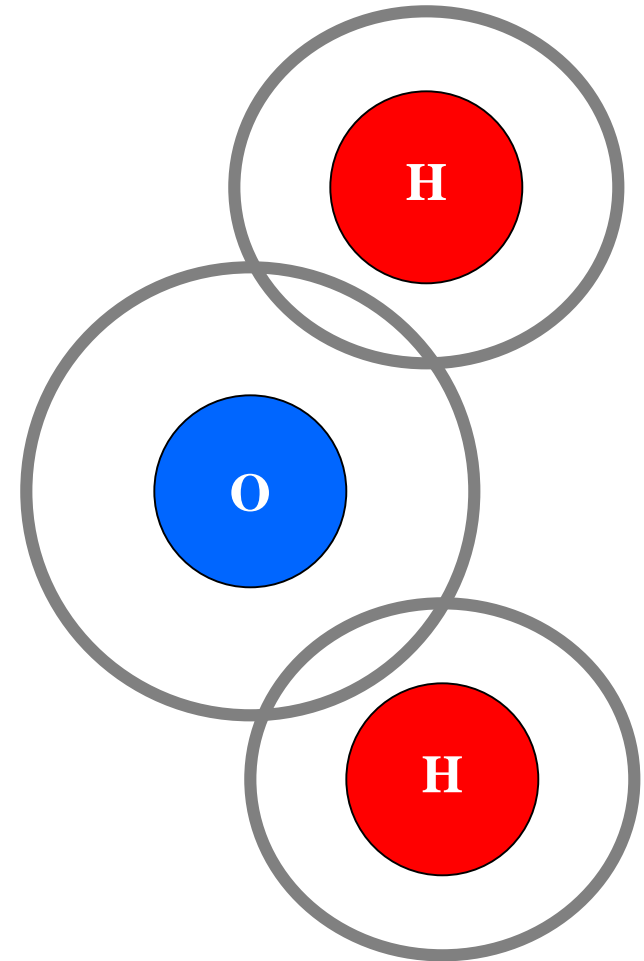


WATER

# HCL ACID DISSOCIATION



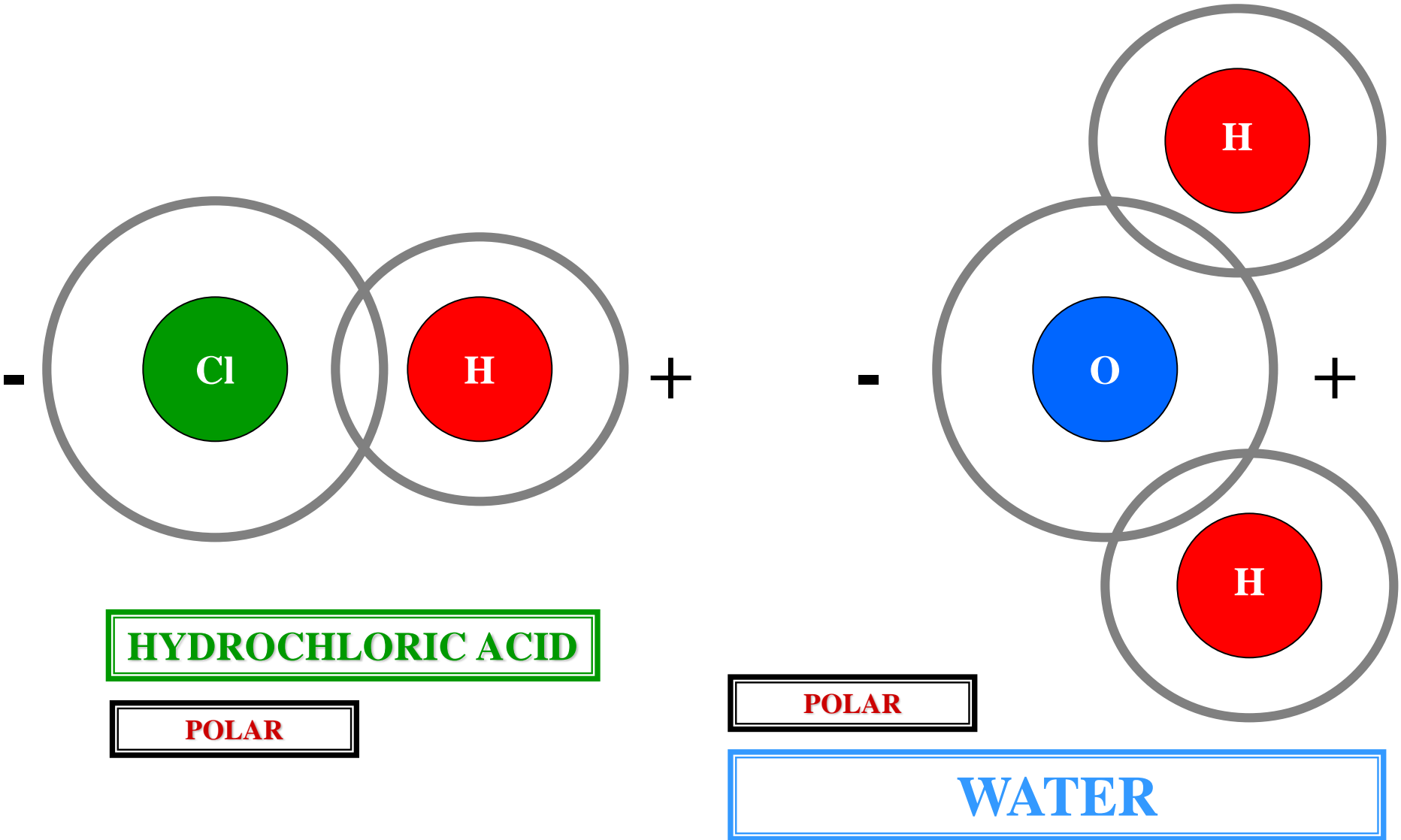
**HYDROCHLORIC ACID**



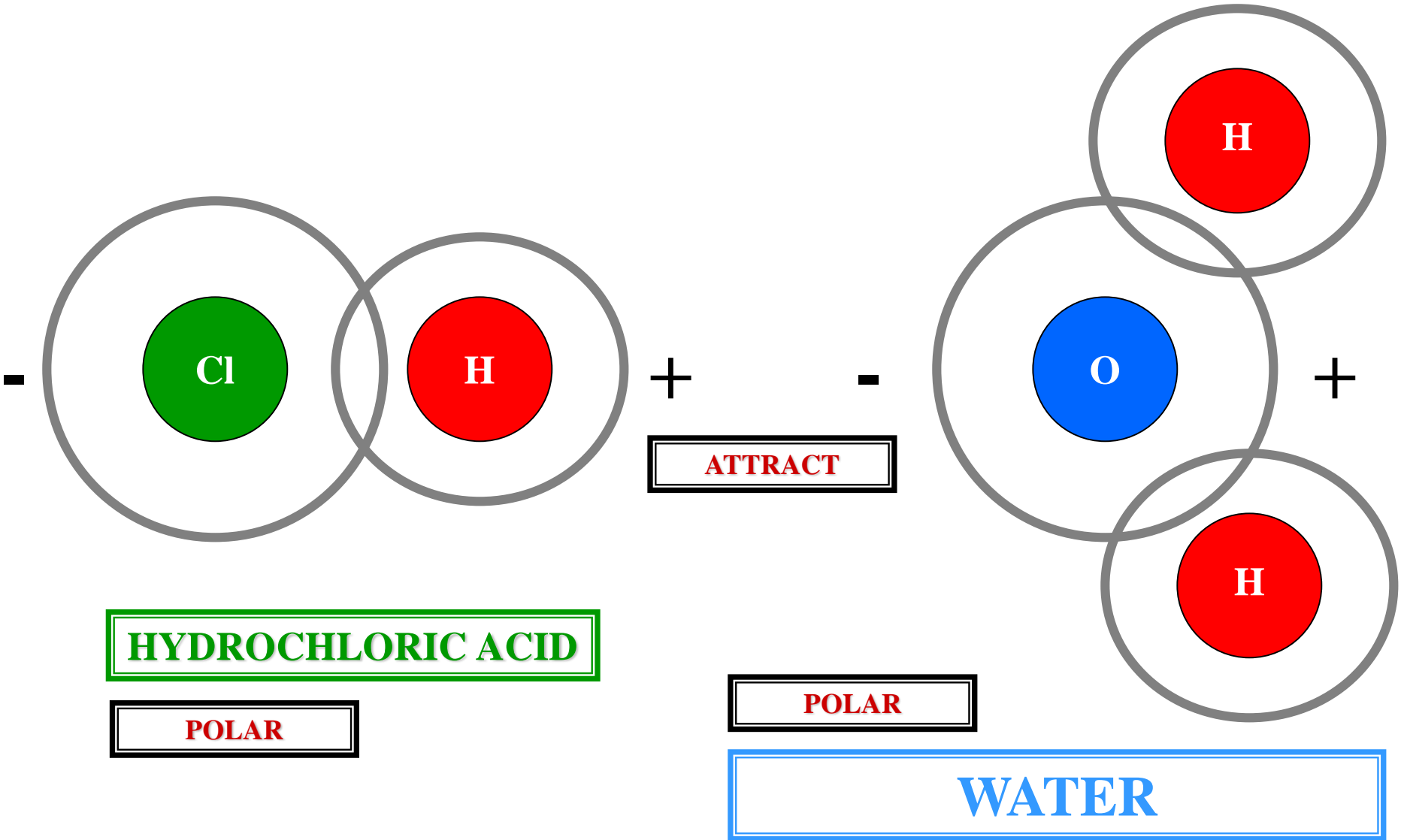
**WATER**



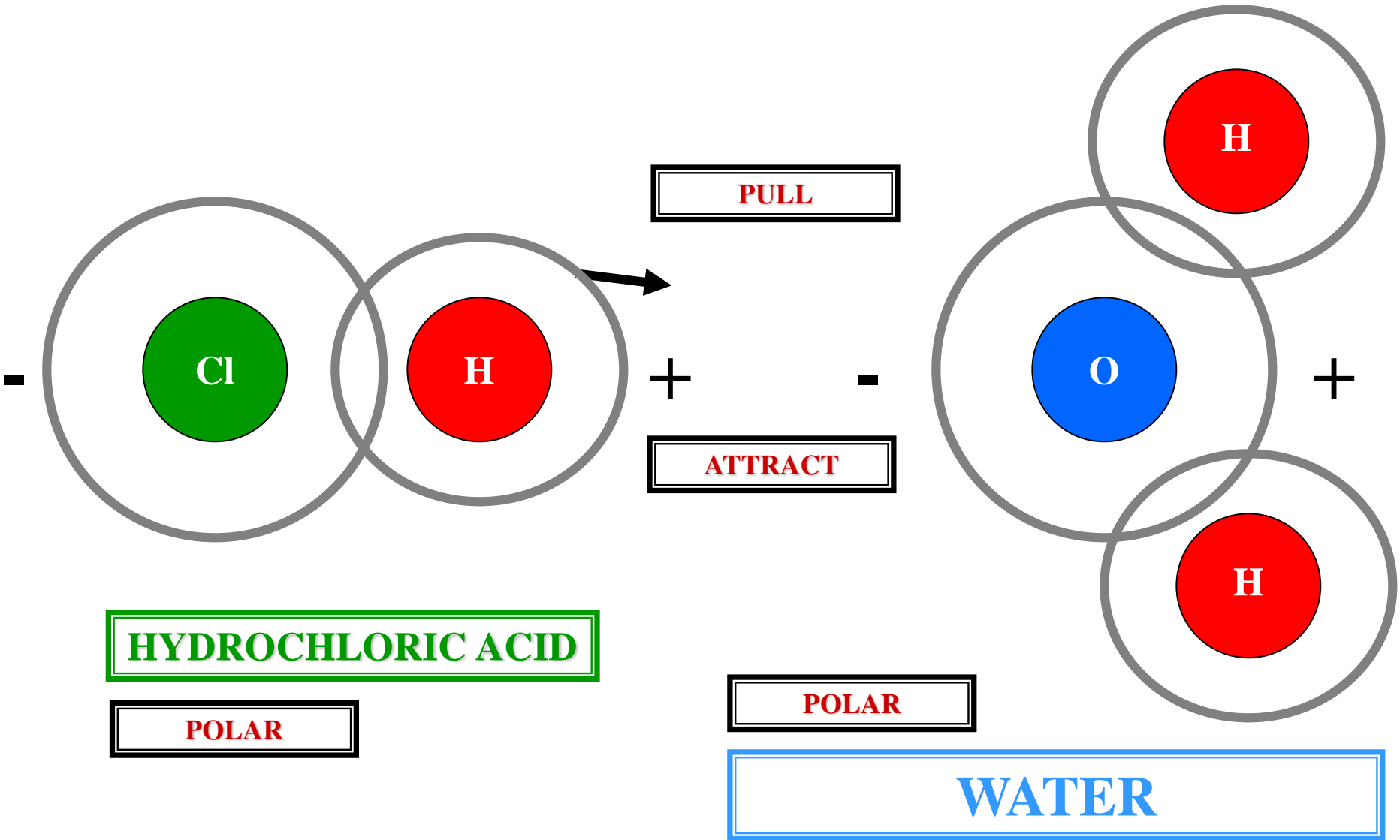
# HCL ACID DISSOCIATION



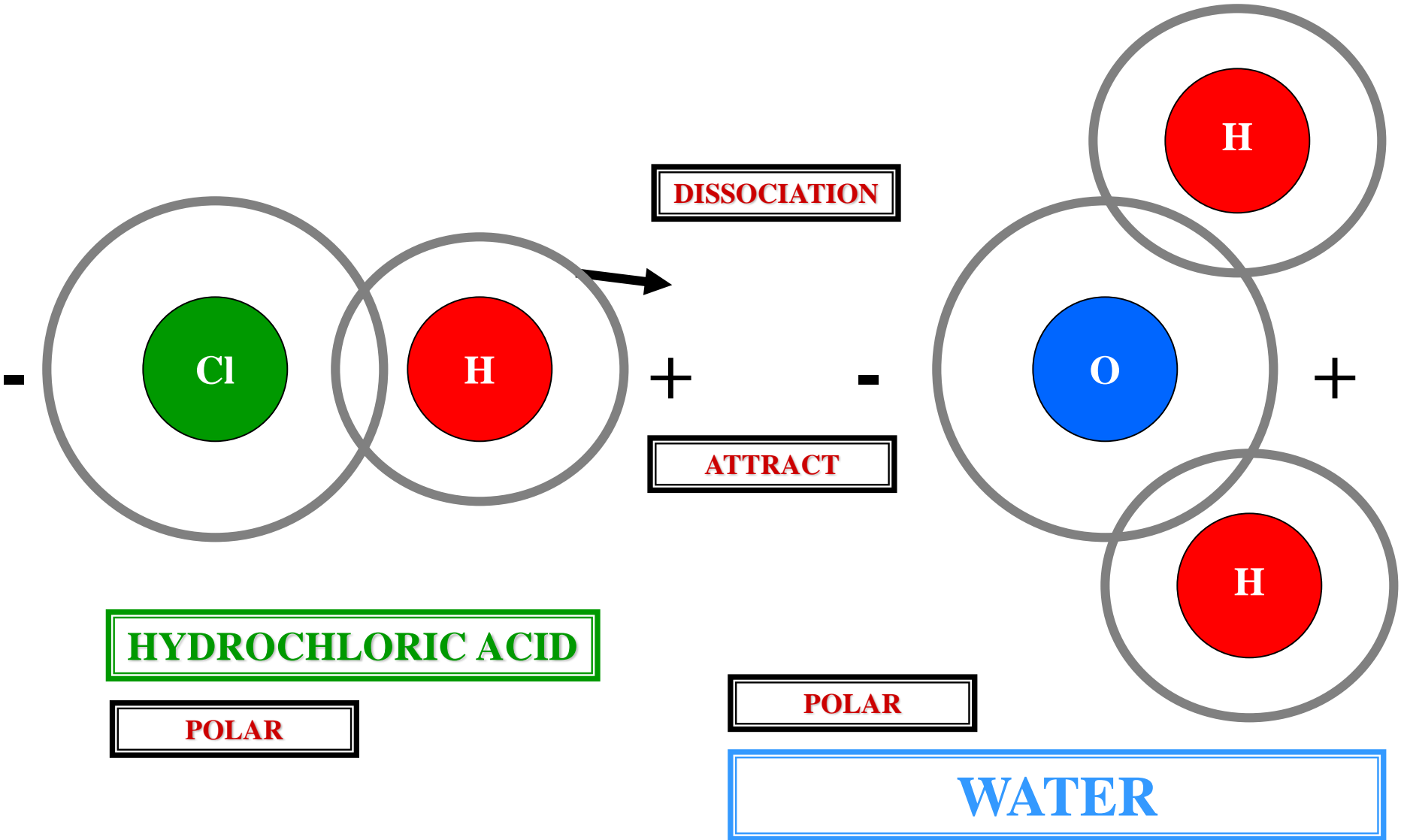
# HCL ACID DISSOCIATION



# HCL ACID DISSOCIATION

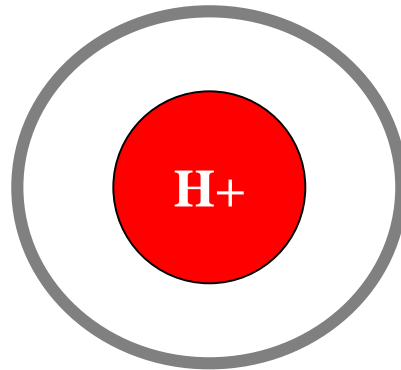
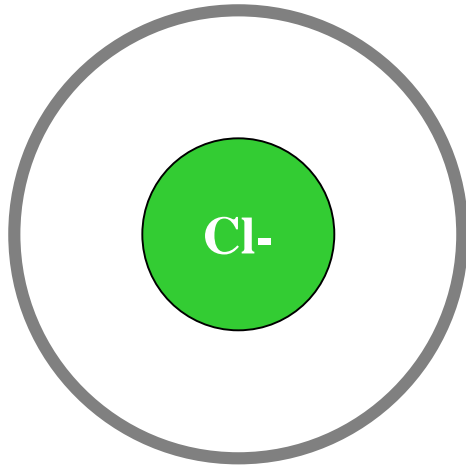


# HCL ACID DISSOCIATION

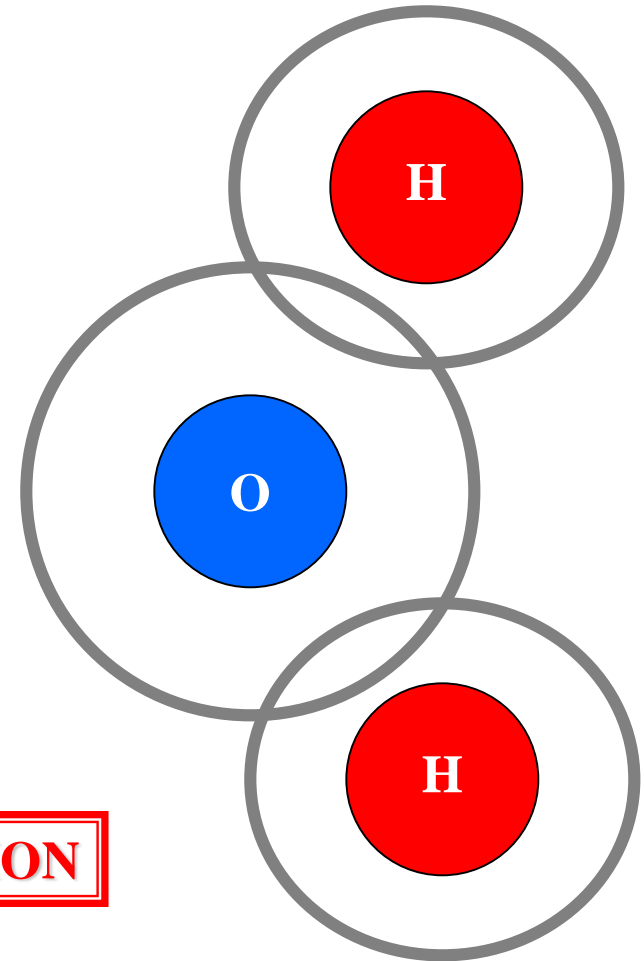


# HCL ACID DISSOCIATION

## ION FORMATION



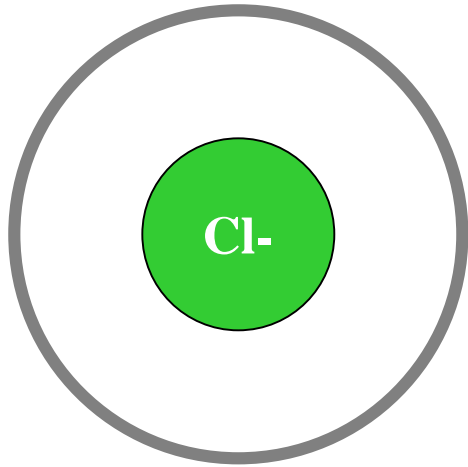
**H<sup>+</sup> = HYDROGEN ION**



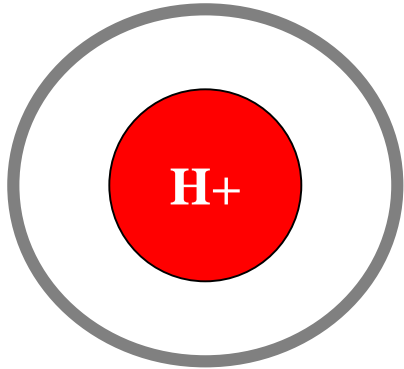
# HCL ACID DISSOCIATION



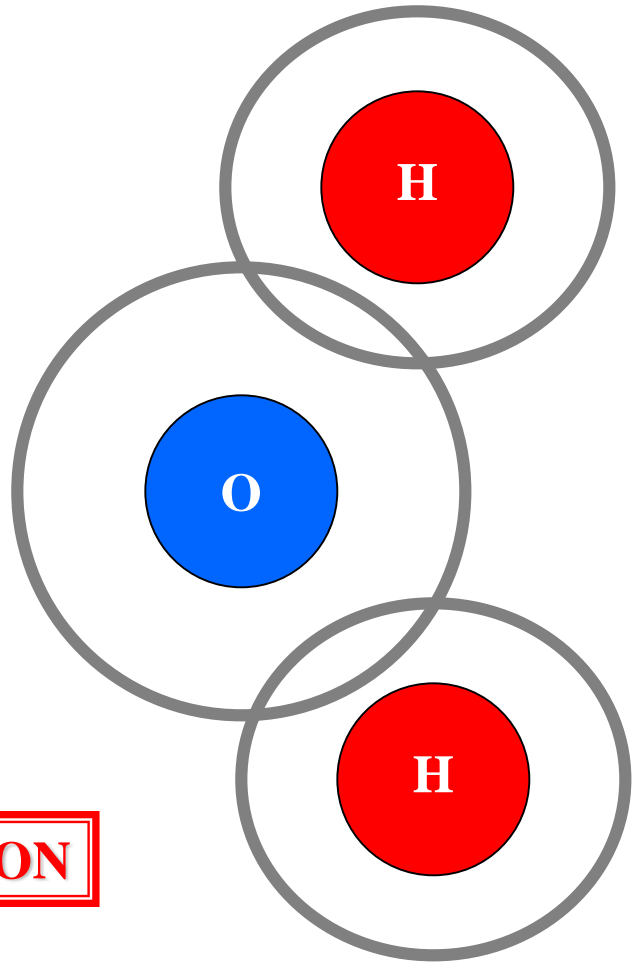
## ION FORMATION



Cl- = CHLORIDE ION



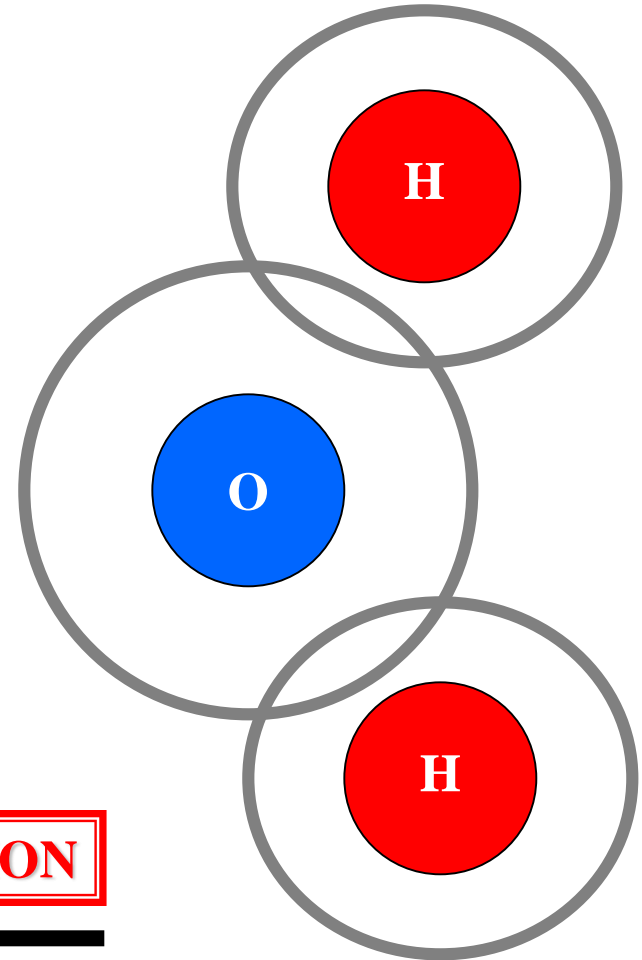
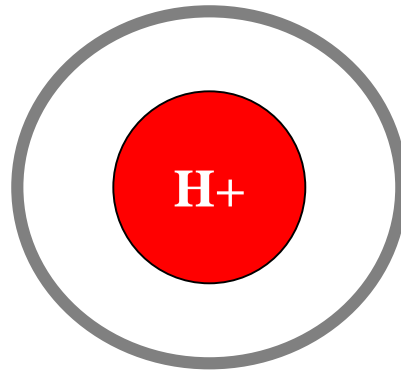
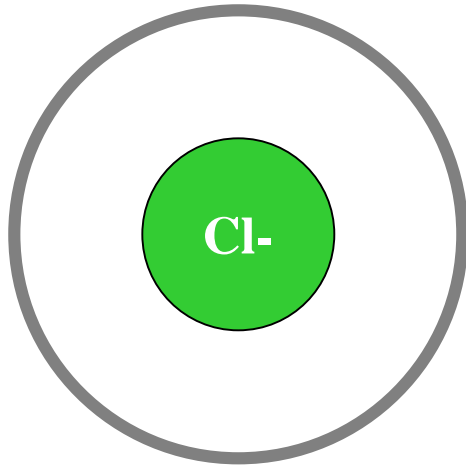
H+ = HYDROGEN ION



# HCL ACID DISSOCIATION

H

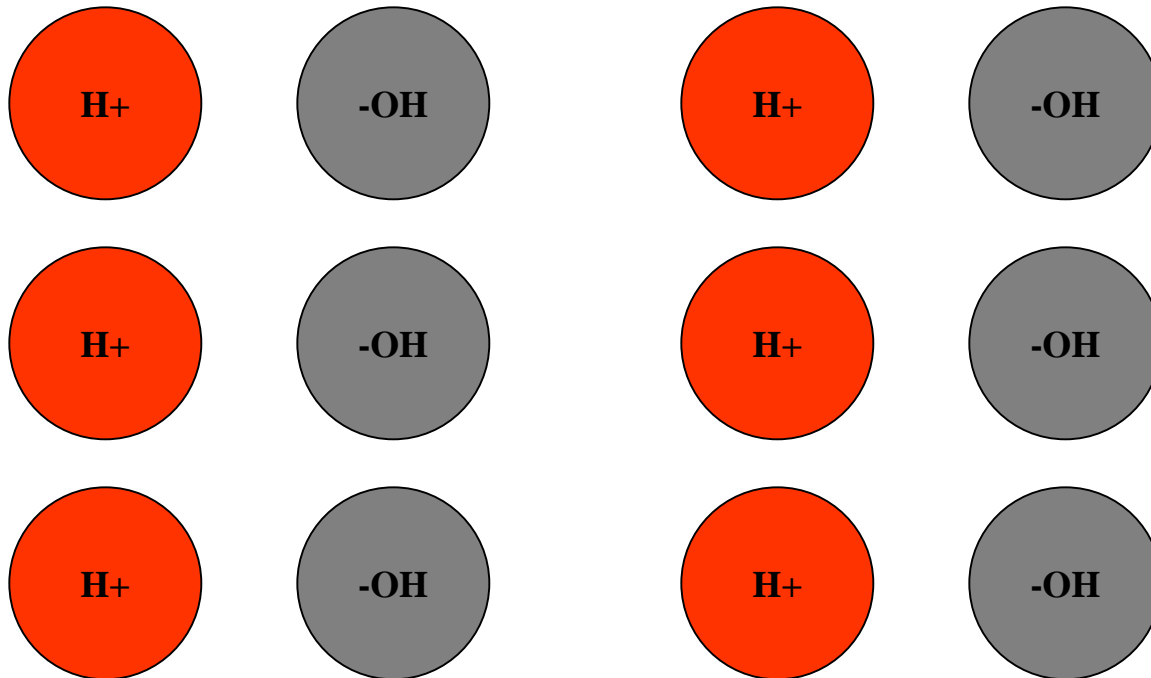
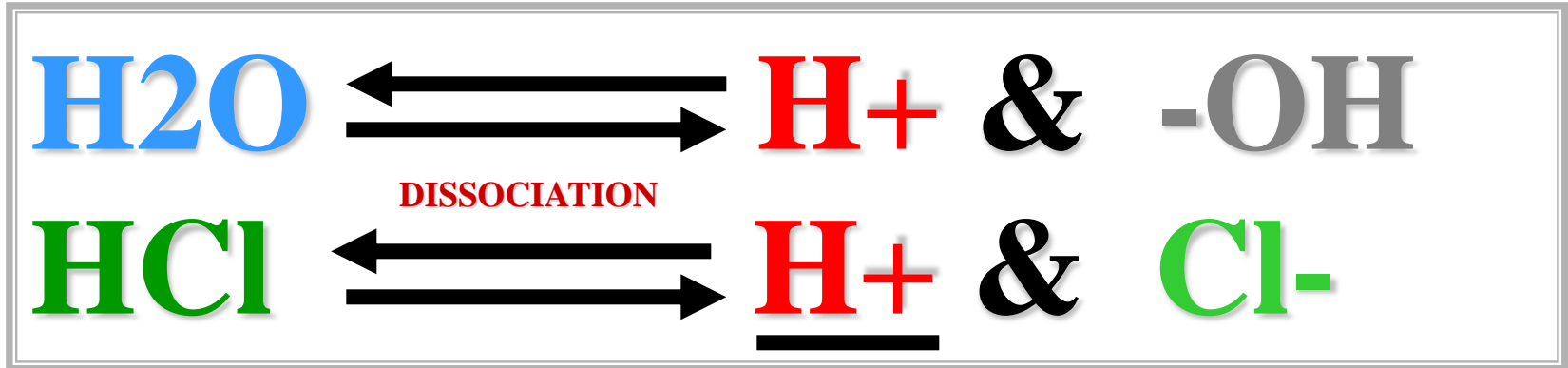
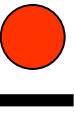
## ION FORMATION



Cl- = CHLORIDE ION

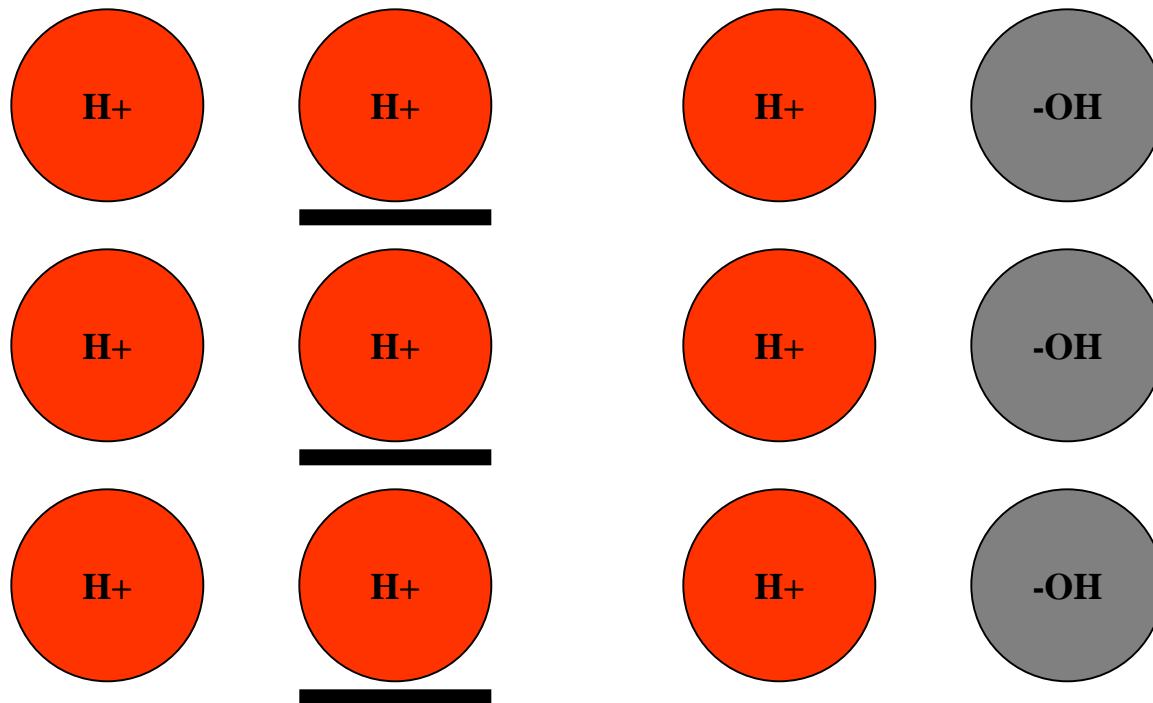
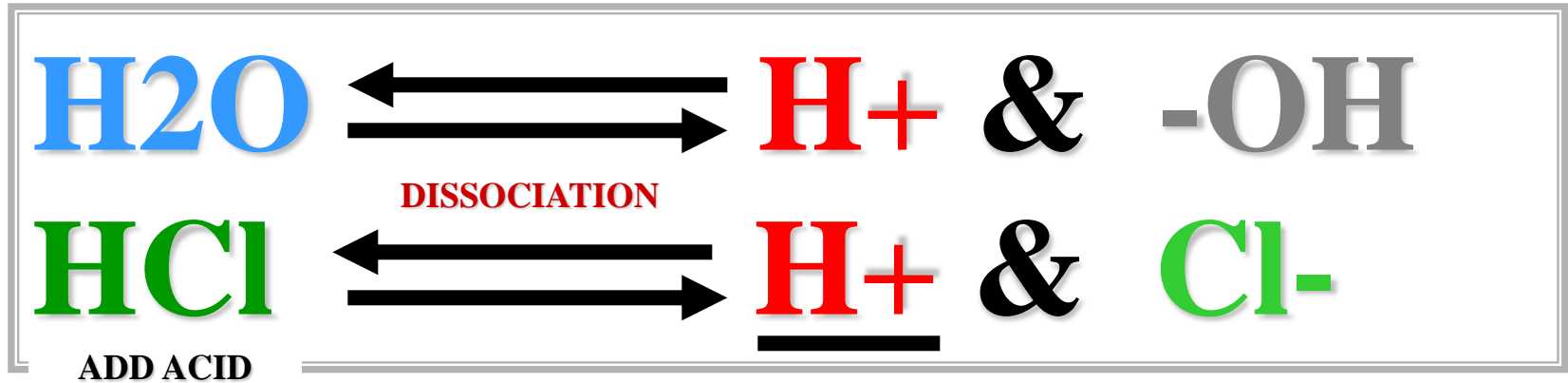
H+ = HYDROGEN ION

# AQUEOUS SOLUTION

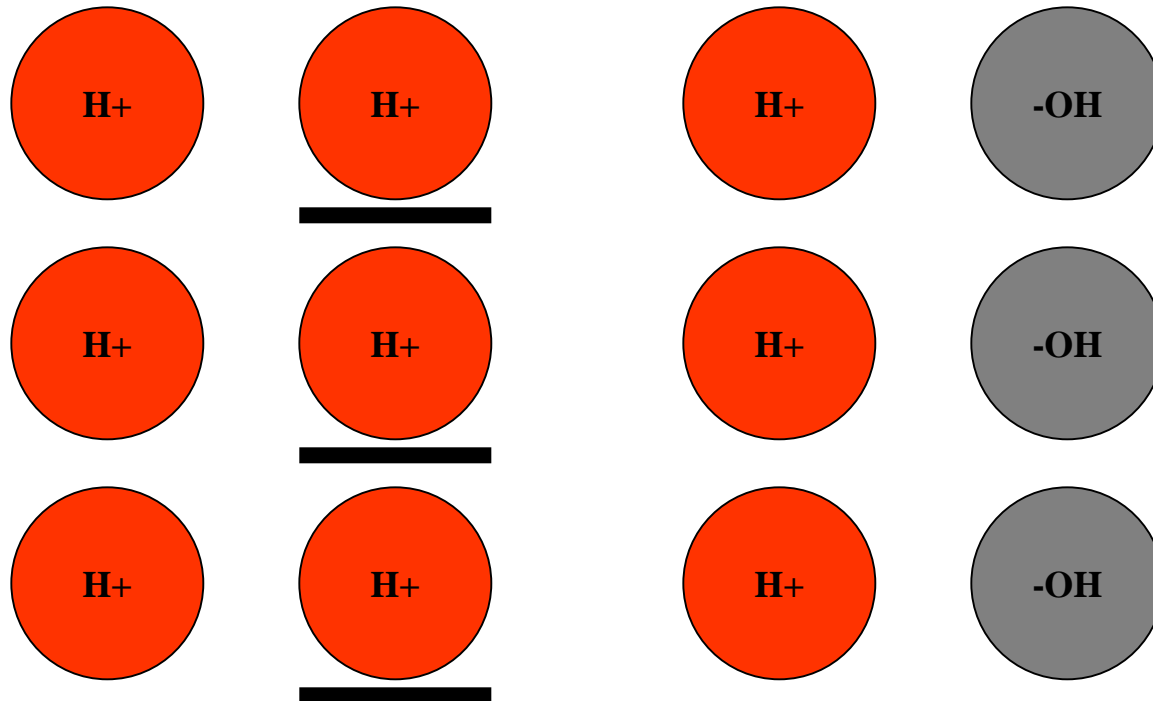
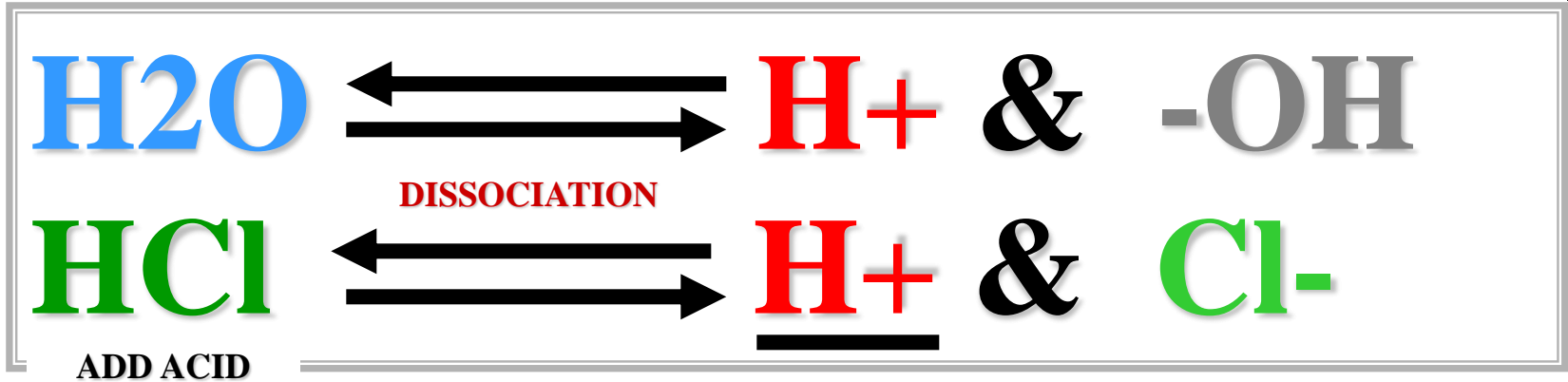




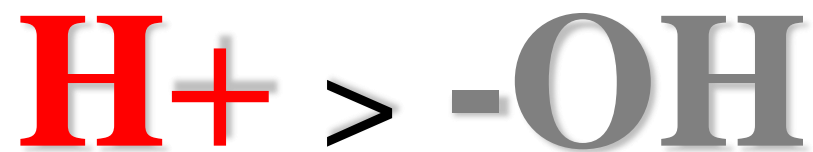
# AQUEOUS SOLUTION



# ACIDIC SOLUTION



# AQUEOUS SOLUTION



**ACIDIC SOLUTION**

# **BASIC SOLUTION**

# **BASIC SOLUTION**



# **BASIC SOLUTION**

**HIGH -OH CONCENTRATION**  
**LOW H<sup>+</sup> CONCENTRATION**

**BASIC SOLUTION**

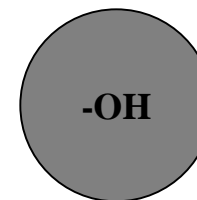
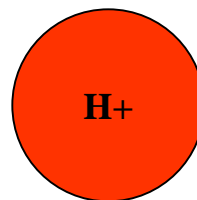
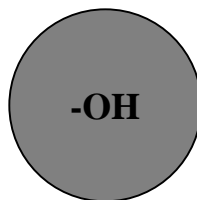
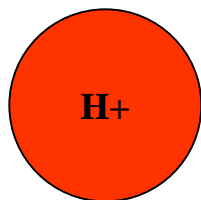
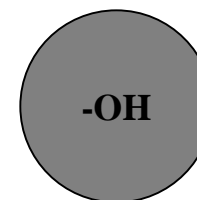
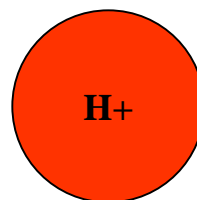
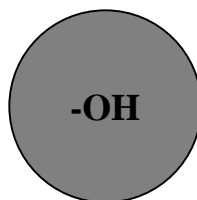
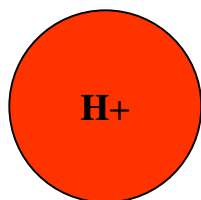
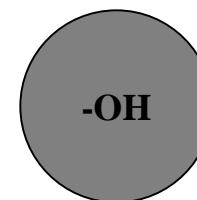
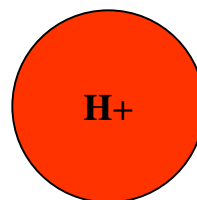
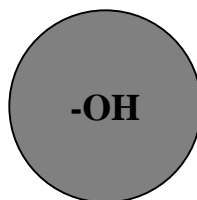
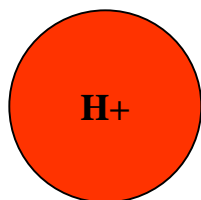


# AQUEOUS SOLUTION



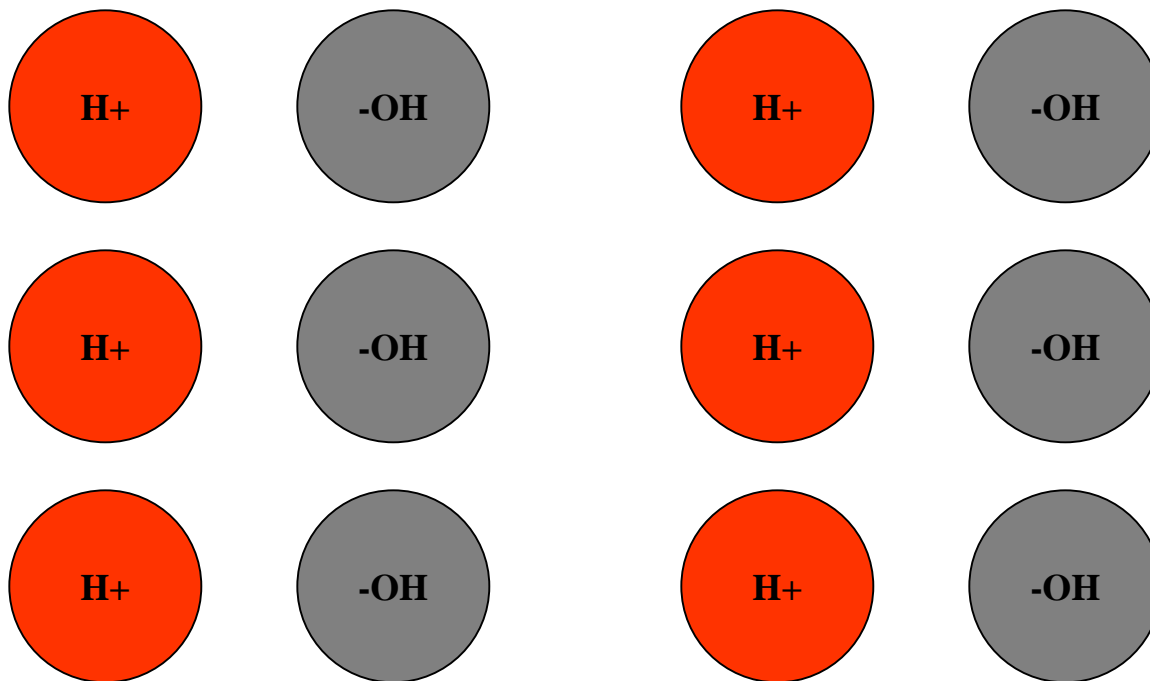
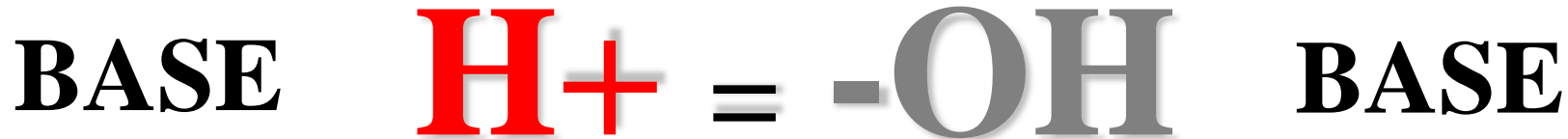
+

B





# AQUEOUS SOLUTION



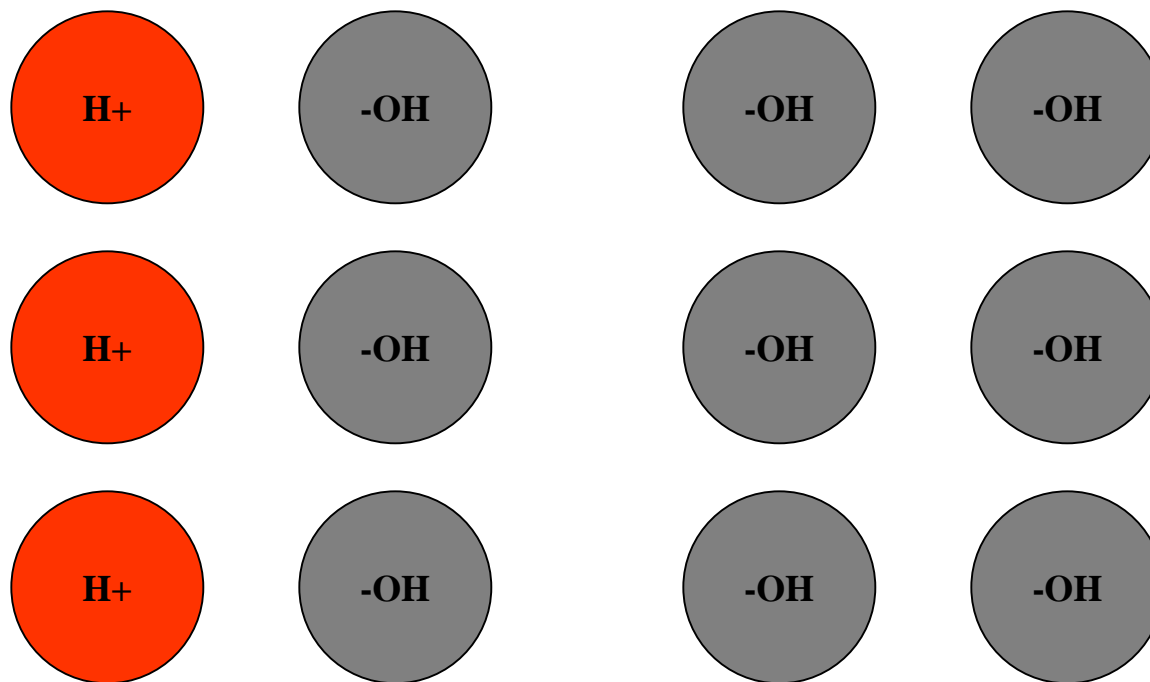
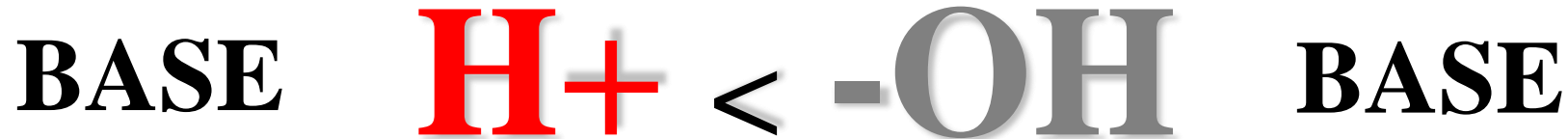




# AQUEOUS SOLUTION

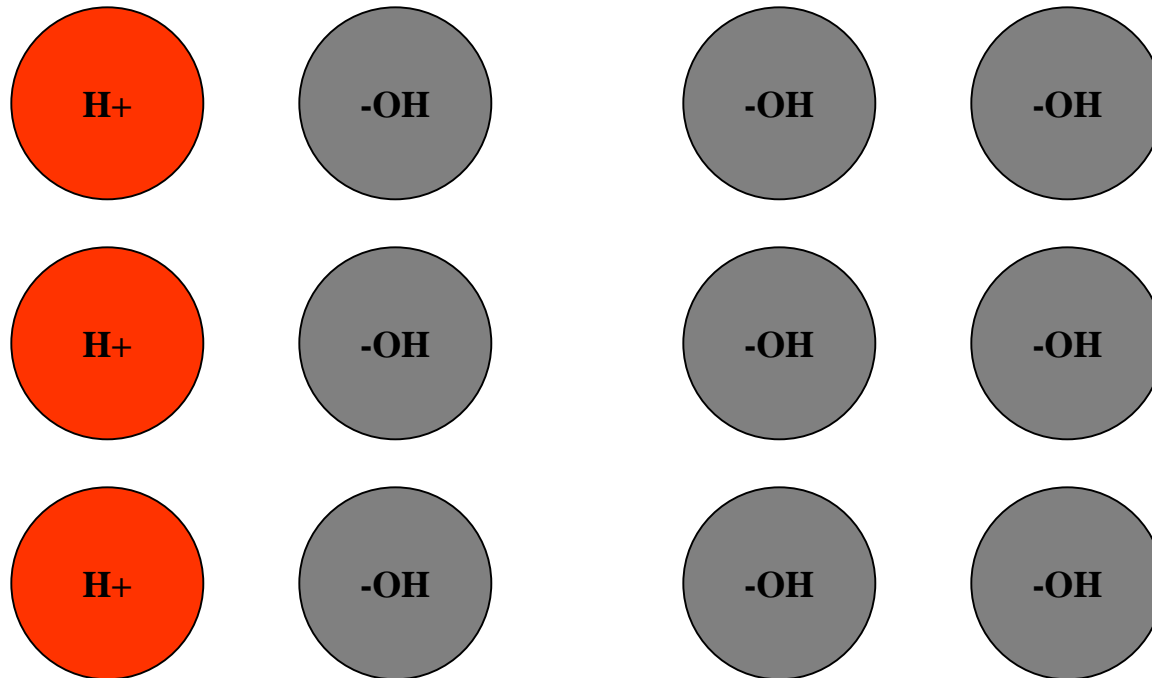
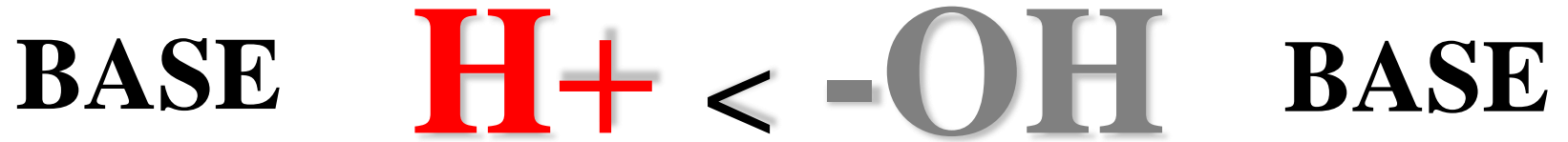


BS





# BASIC SOLUTION



# BASE

**BASE**

# BASE

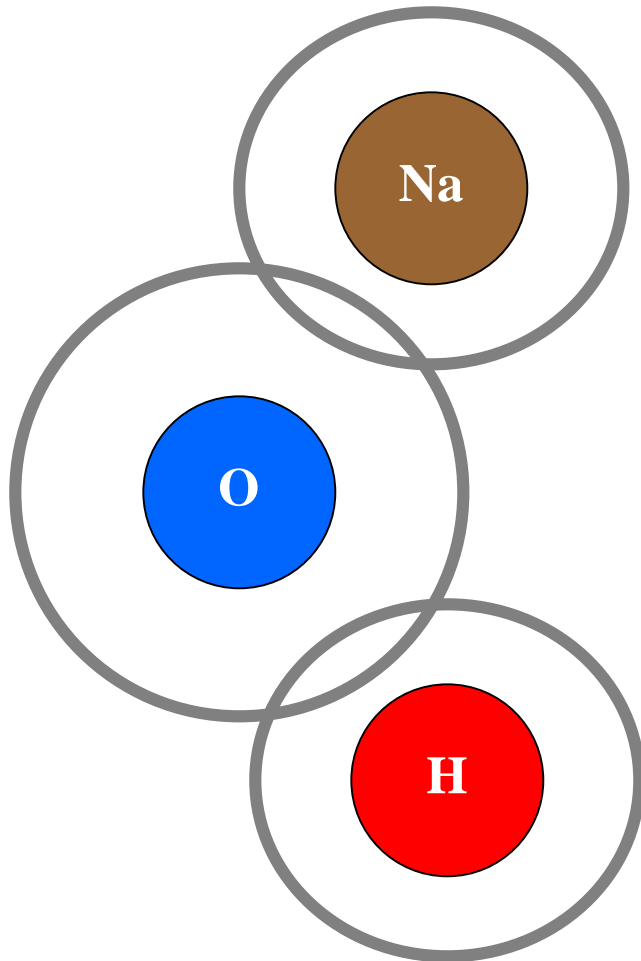
SOLUTE THAT INCREASES  
-OH ION CONCENTRATION  
IN AN AQUEOUS SOLUTION

BASE

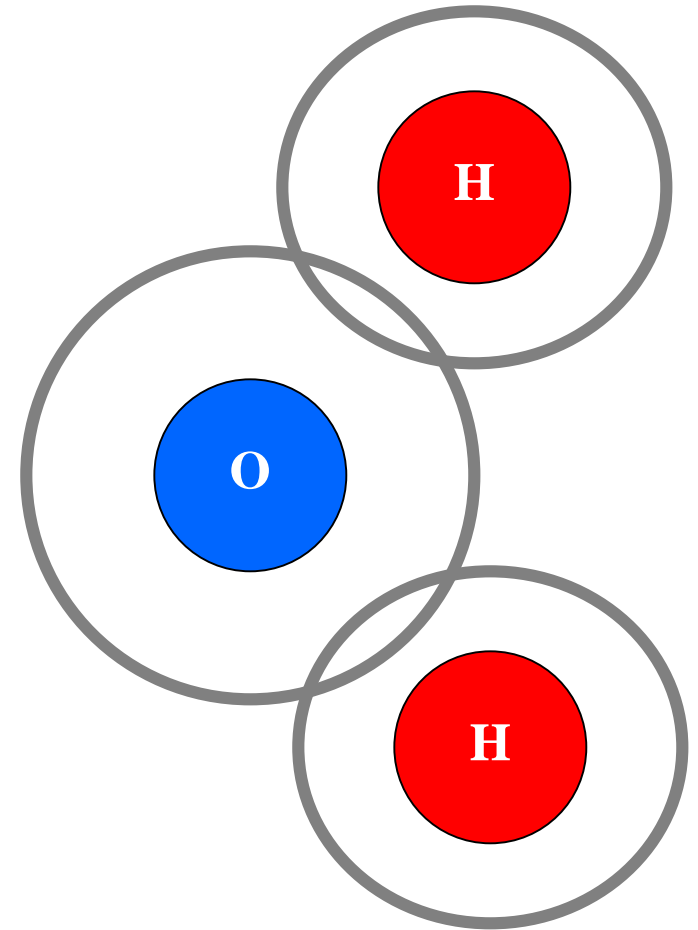


# BASE EXAMPLE

# NaOH DISSOCIATION

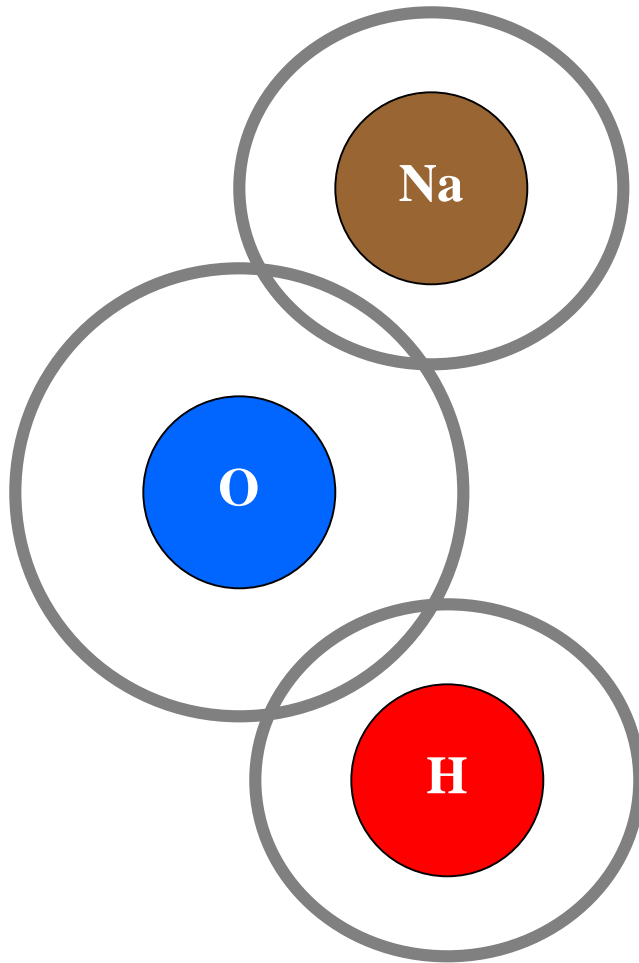


NaOH

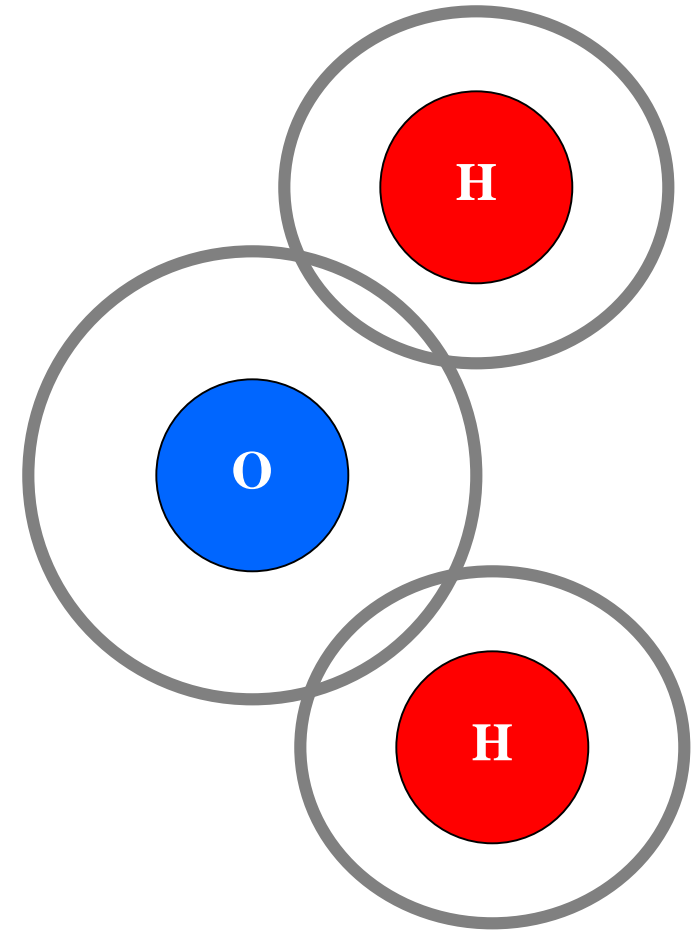


WATER

# NaOH DISSOCIATION



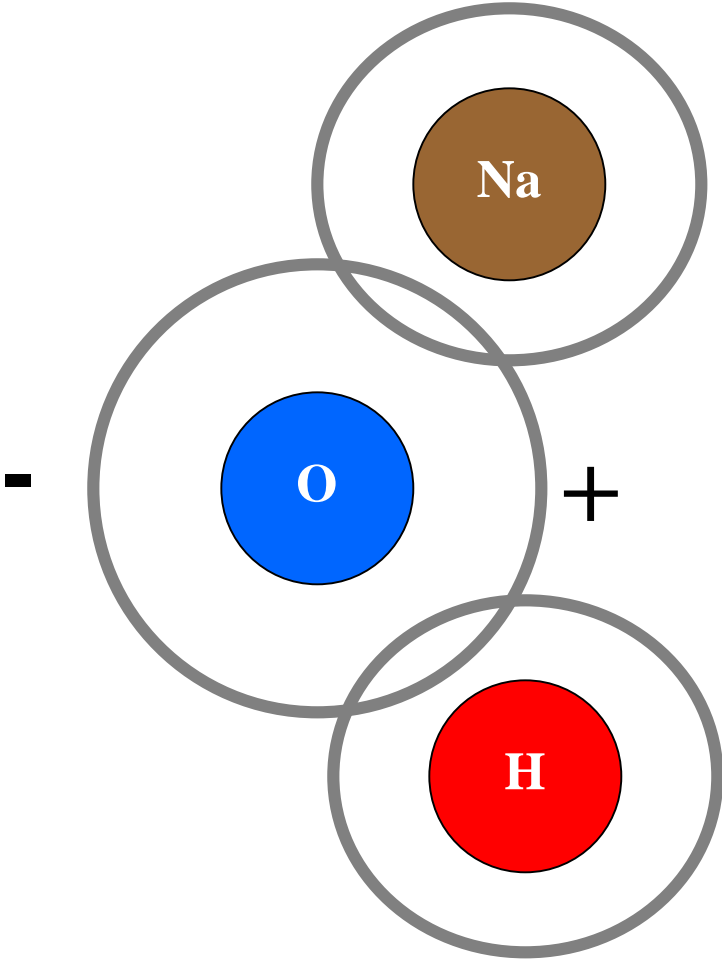
**SODIUM HYDROXIDE**



**WATER**

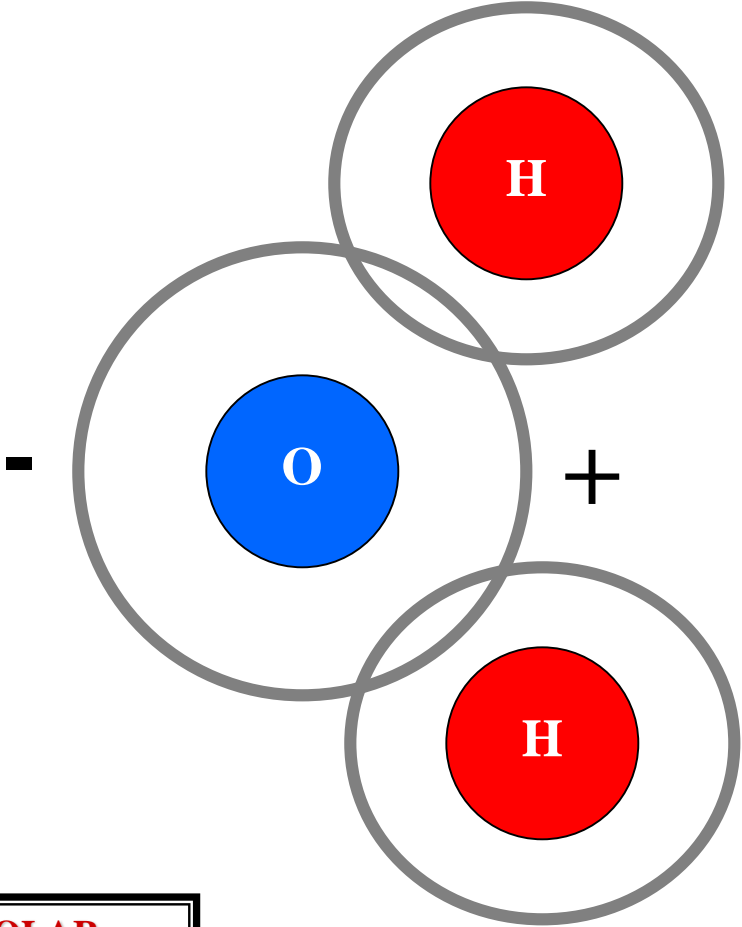


# NaOH DISSOCIATION



SODIUM HYDROXIDE

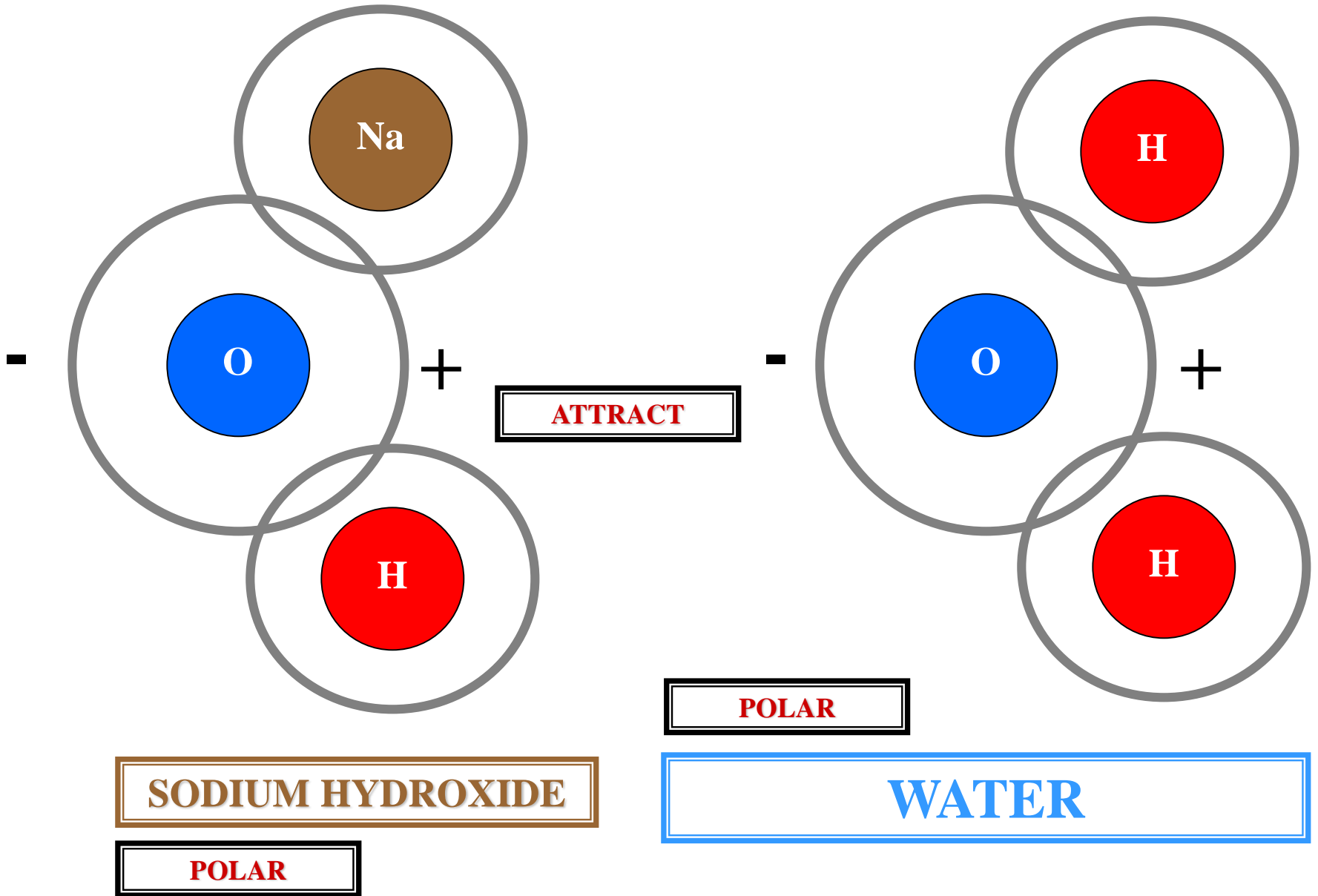
POLAR



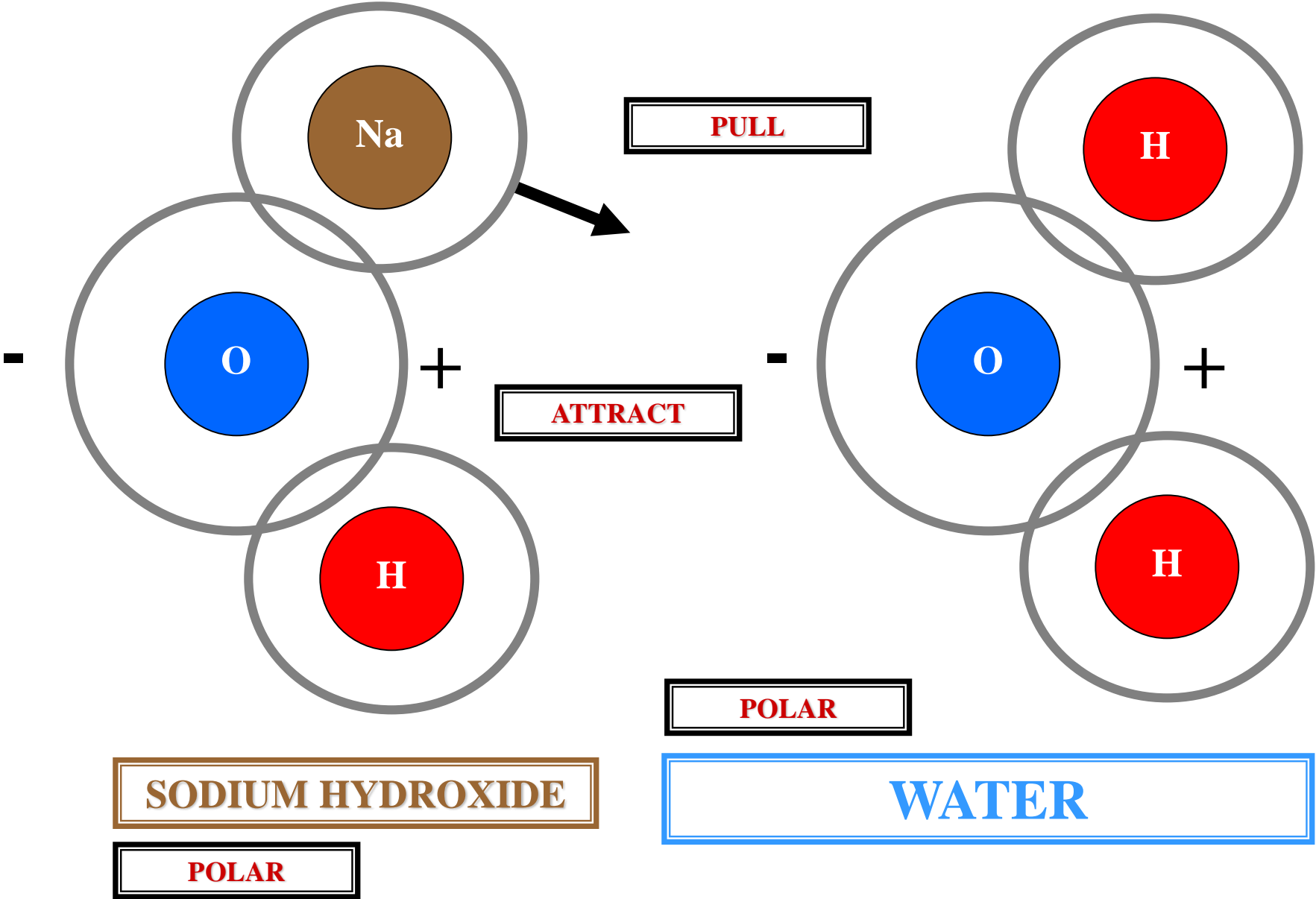
POLAR

WATER

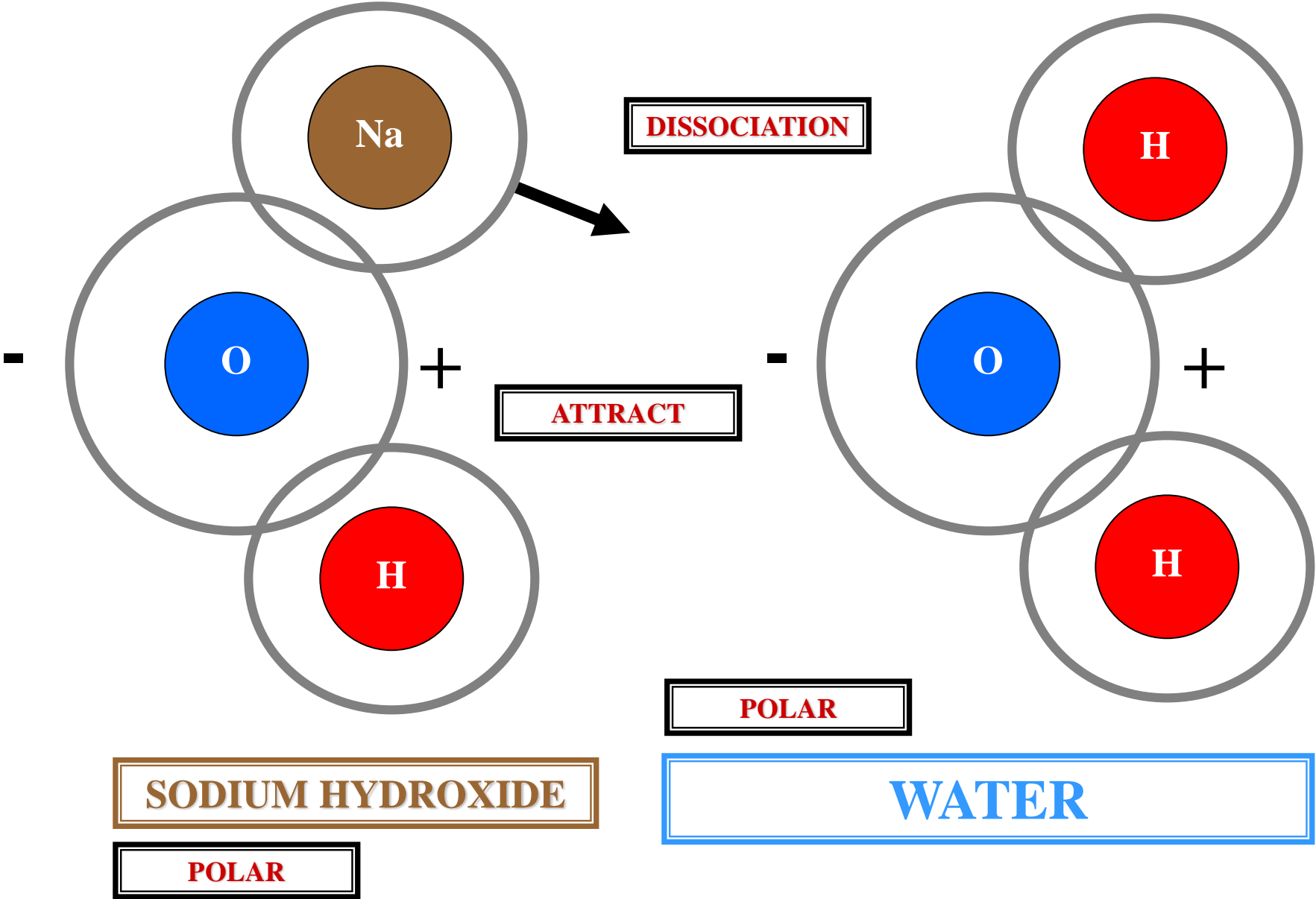
# NaOH DISSOCIATION



# NaOH DISSOCIATION

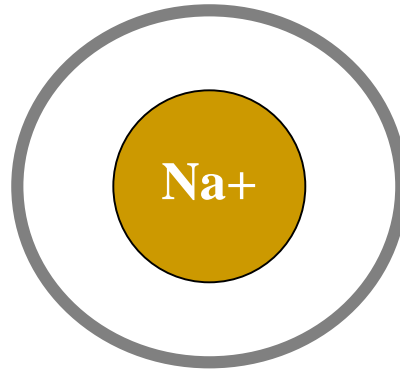
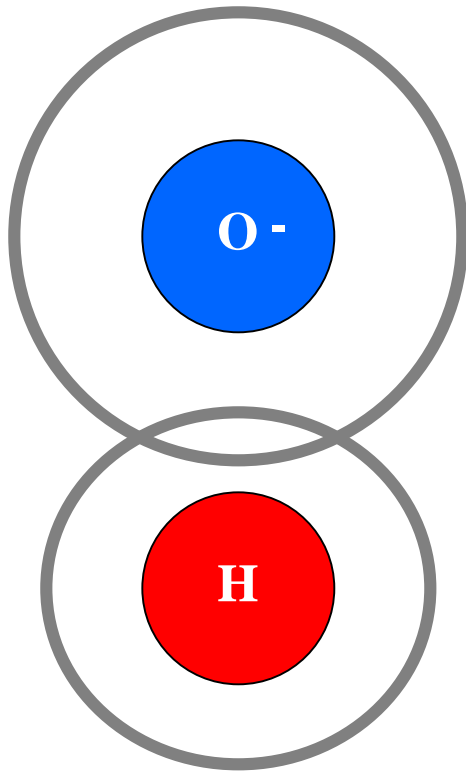


# NaOH DISSOCIATION

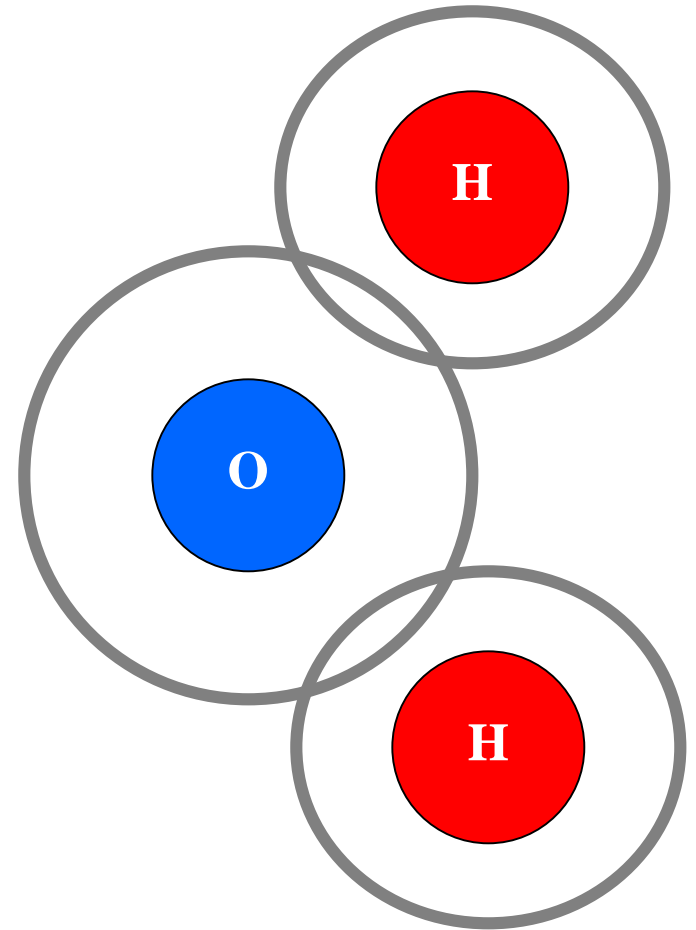


# NaOH DISSOCIATION

## ION FORMATION



Na + = SODIUM ION

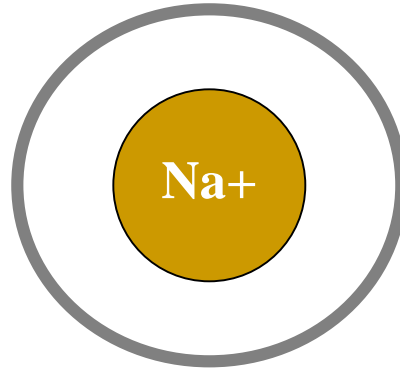
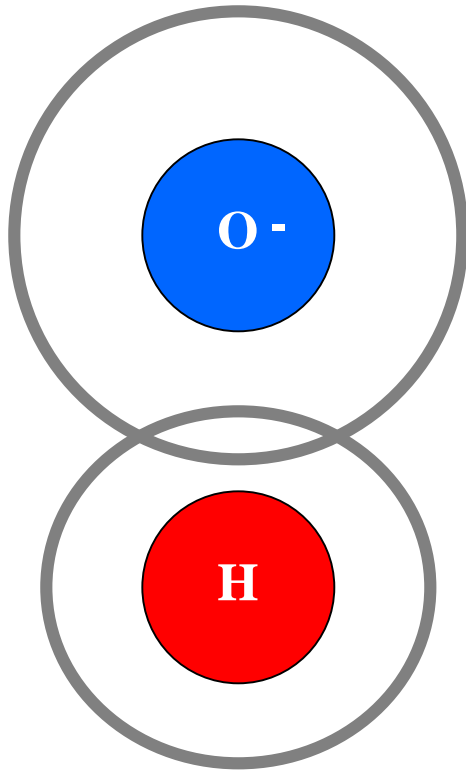


WATER

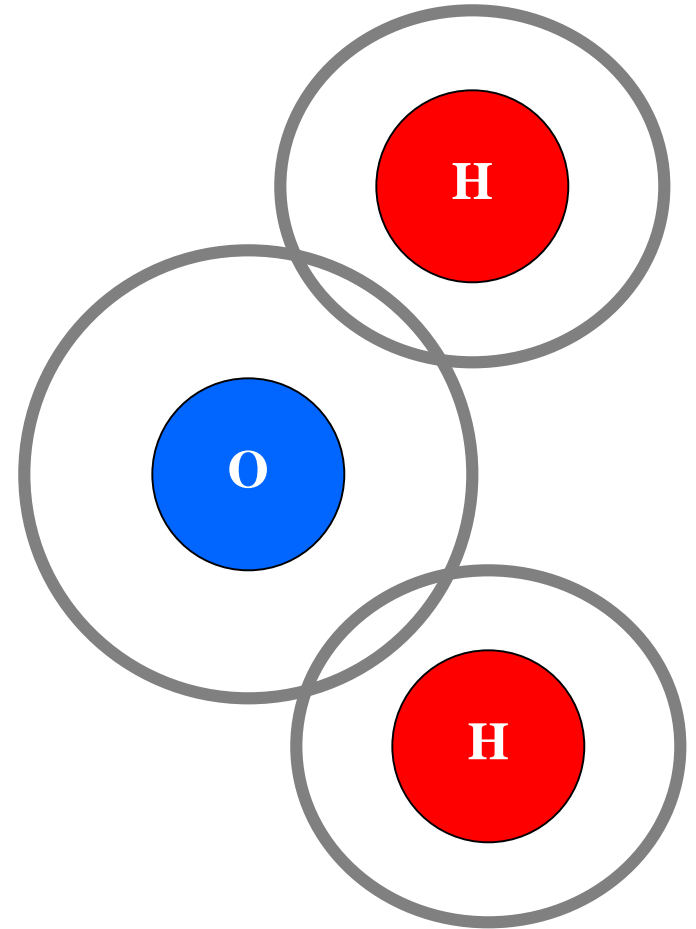
# NaOH DISSOCIATION



## ION FORMATION



Na + = SODIUM ION



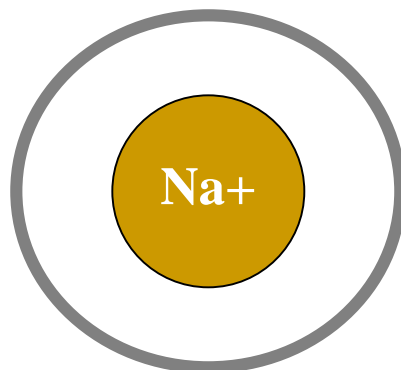
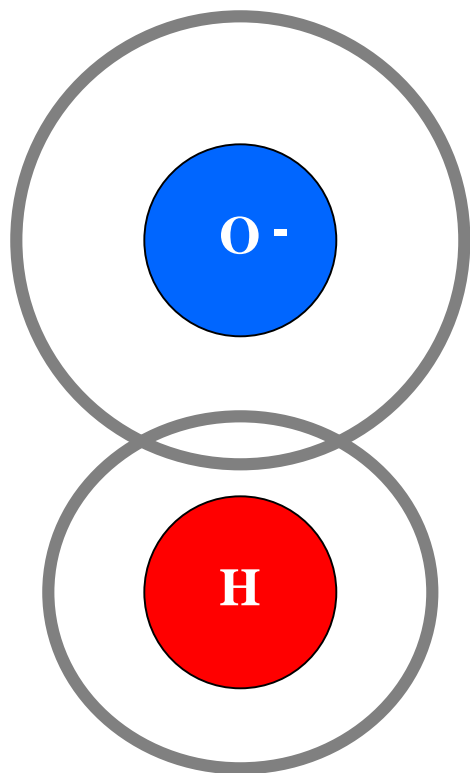
-OH = HYDROXIDE ION

WATER

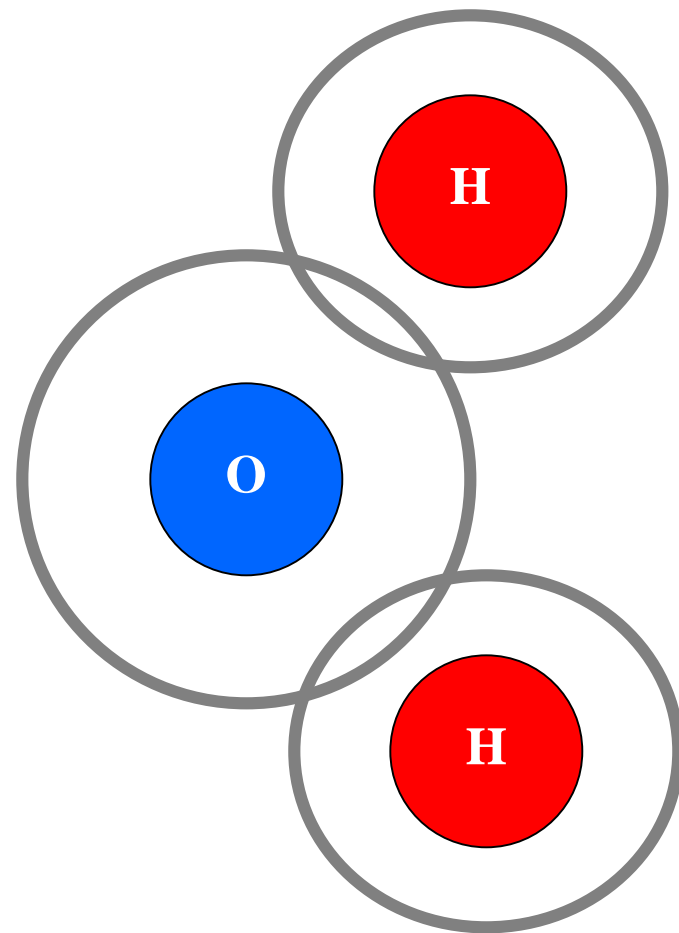
# NaOH DISSOCIATION



## ION FORMATION



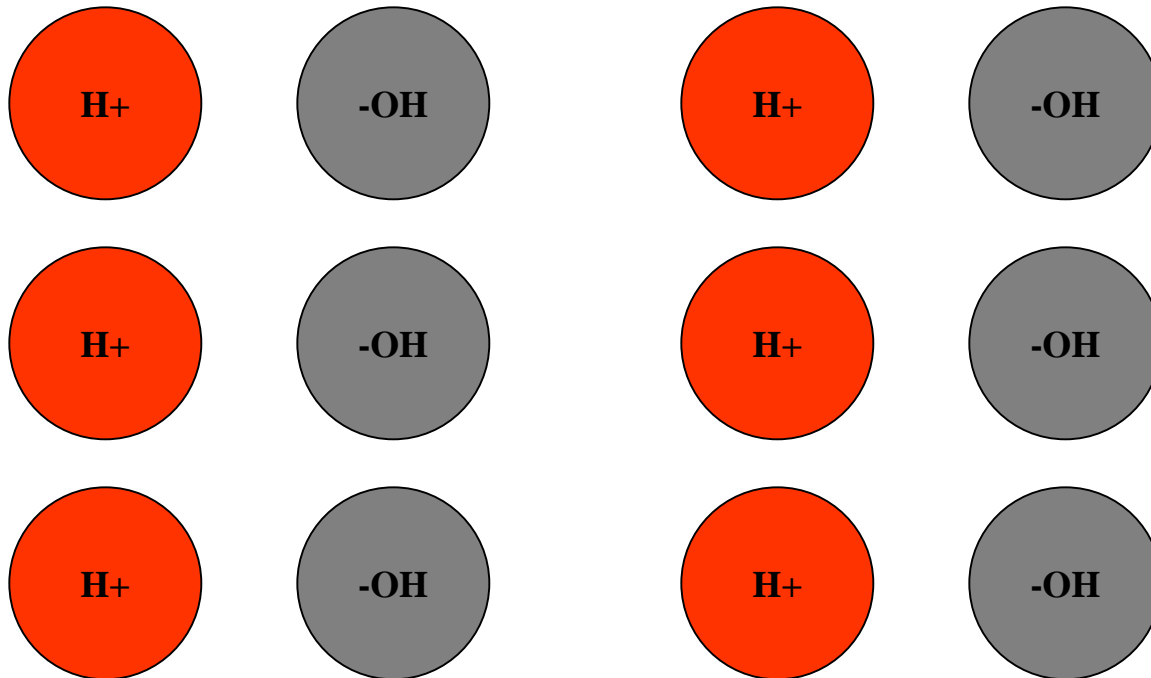
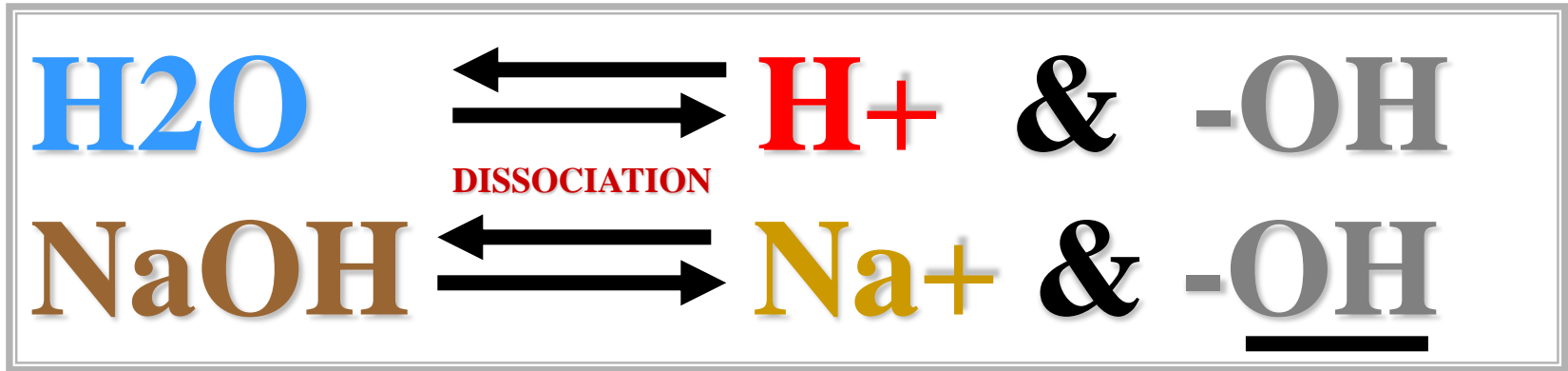
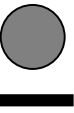
Na + = SODIUM ION



-OH = HYDROXIDE ION

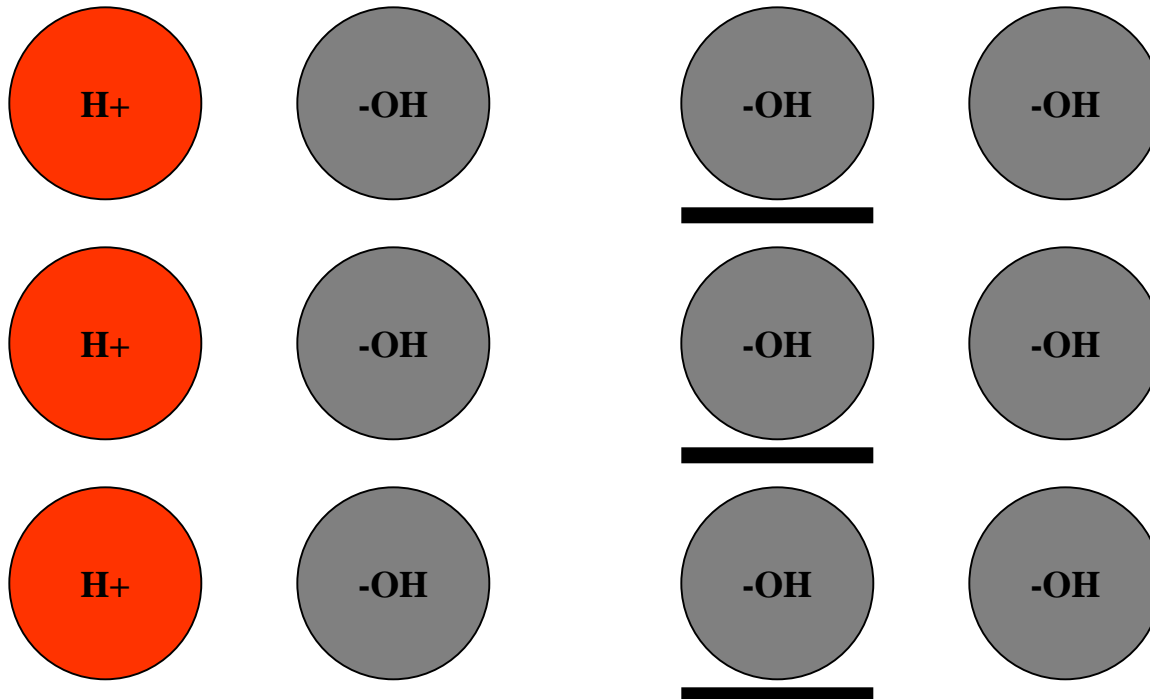
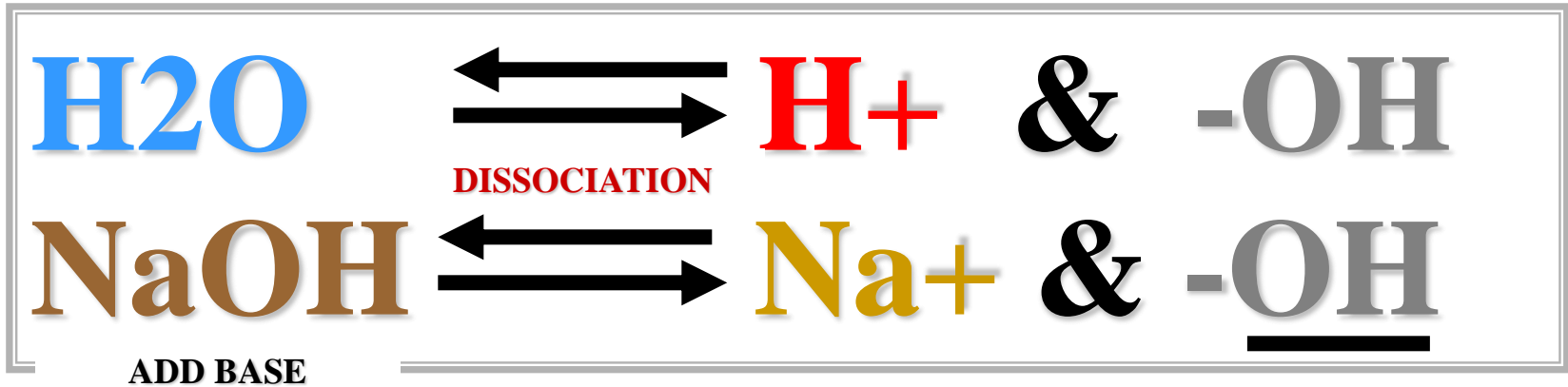
WATER

# AQUEOUS SOLUTION

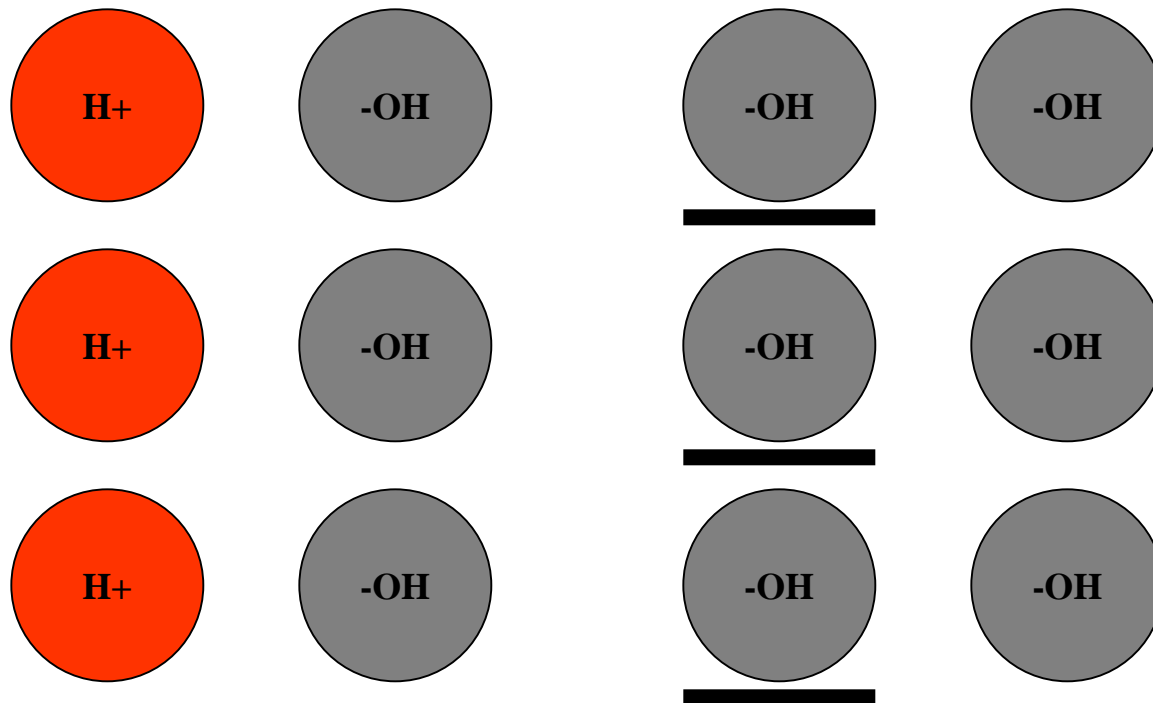
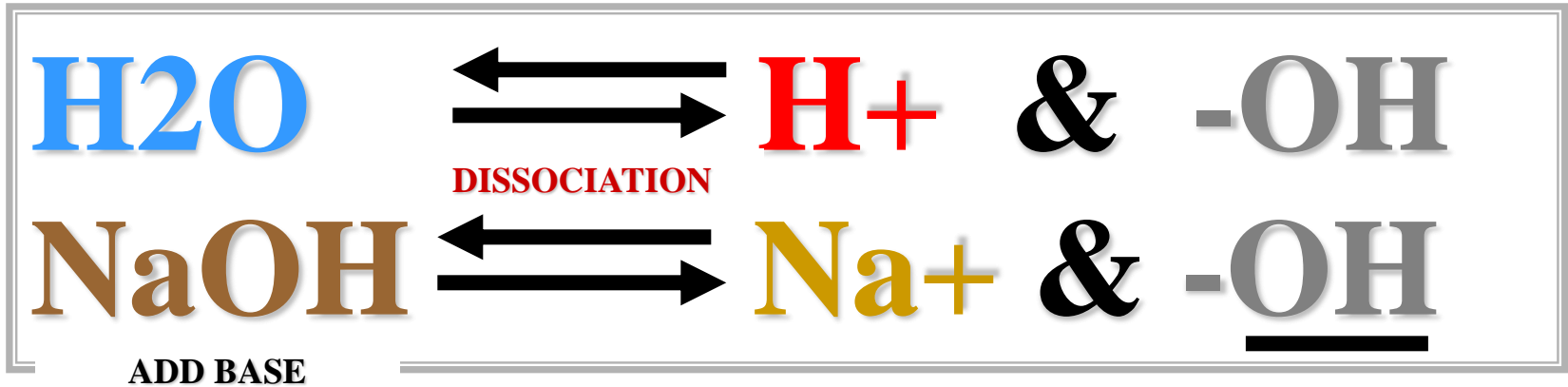




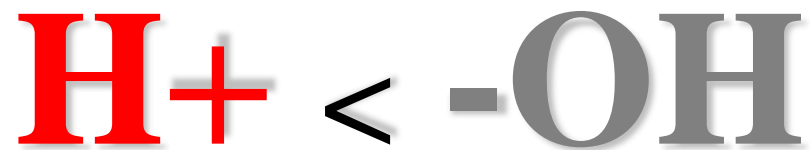
# AQUEOUS SOLUTION



# BASIC SOLUTION



# AQUEOUS SOLUTION



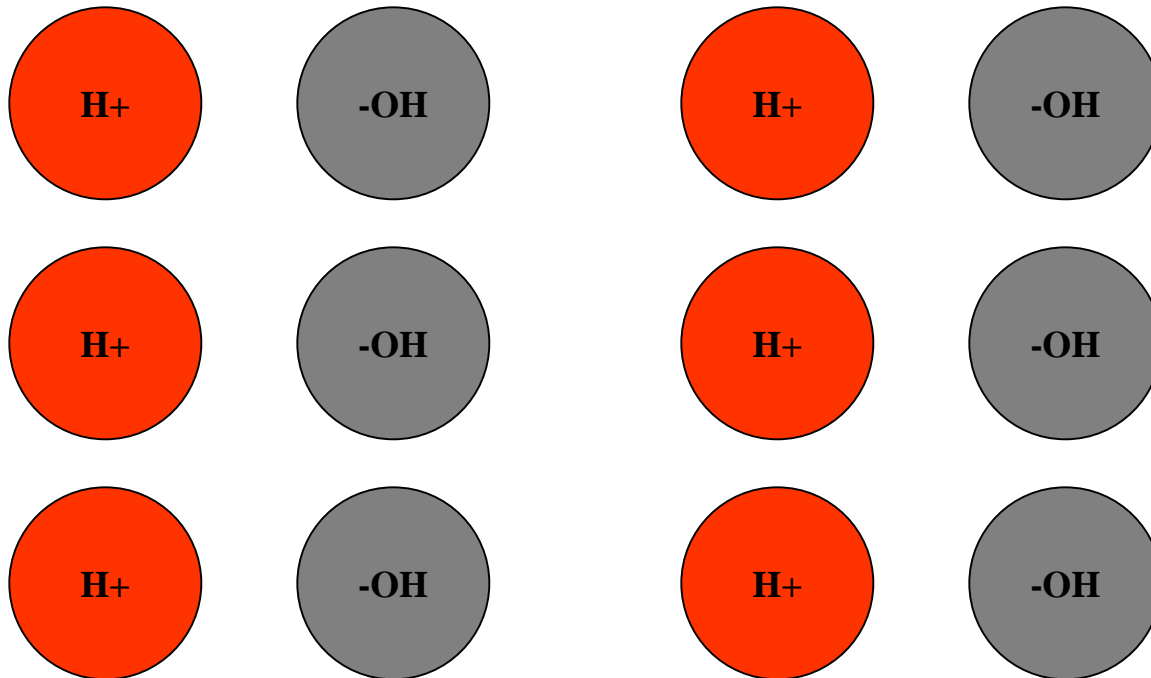
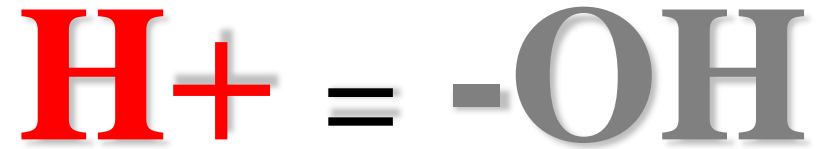
**BASIC SOLUTION**



# ACIDS & BASES SUMMARY



# AQUEOUS SOLUTION

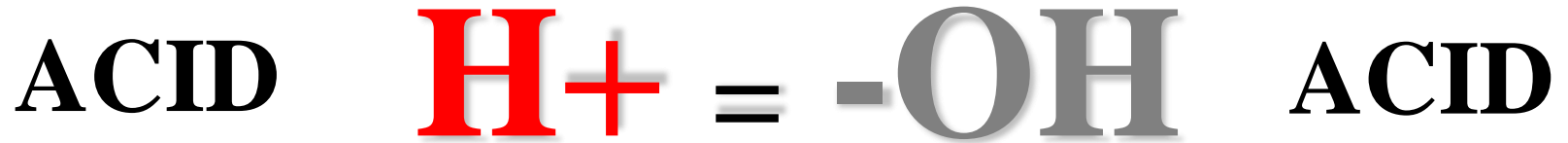


+

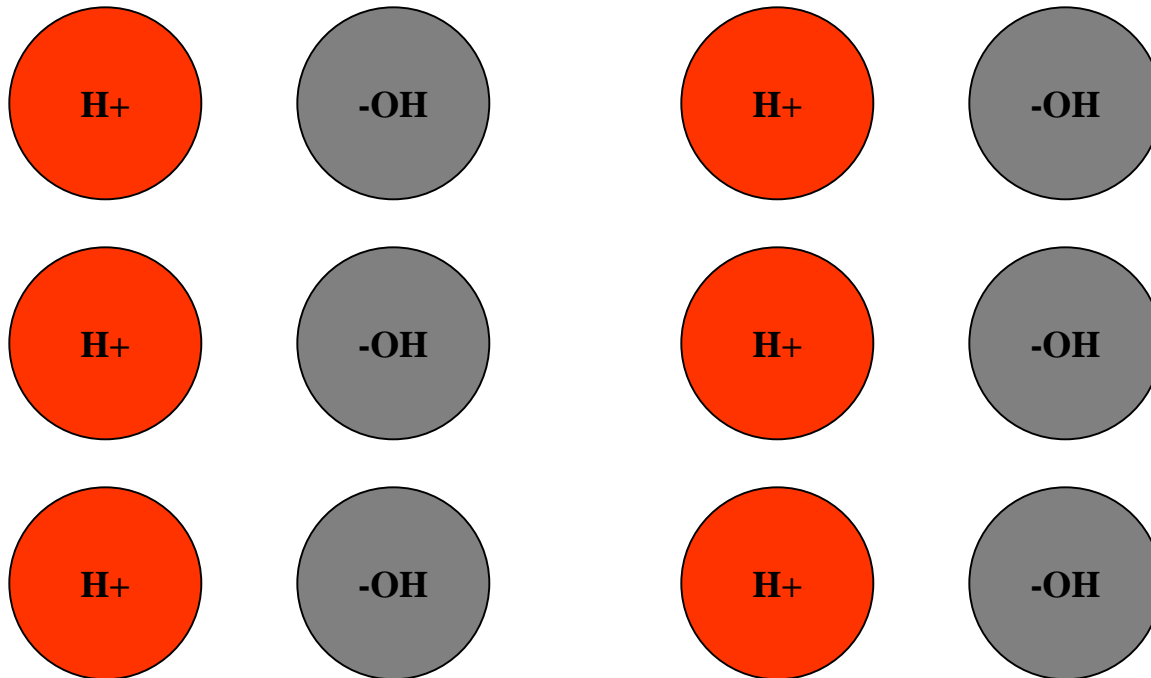
A



# AQUEOUS SOLUTION

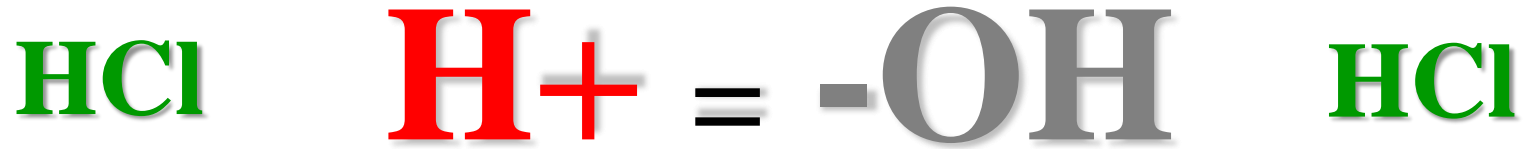


H

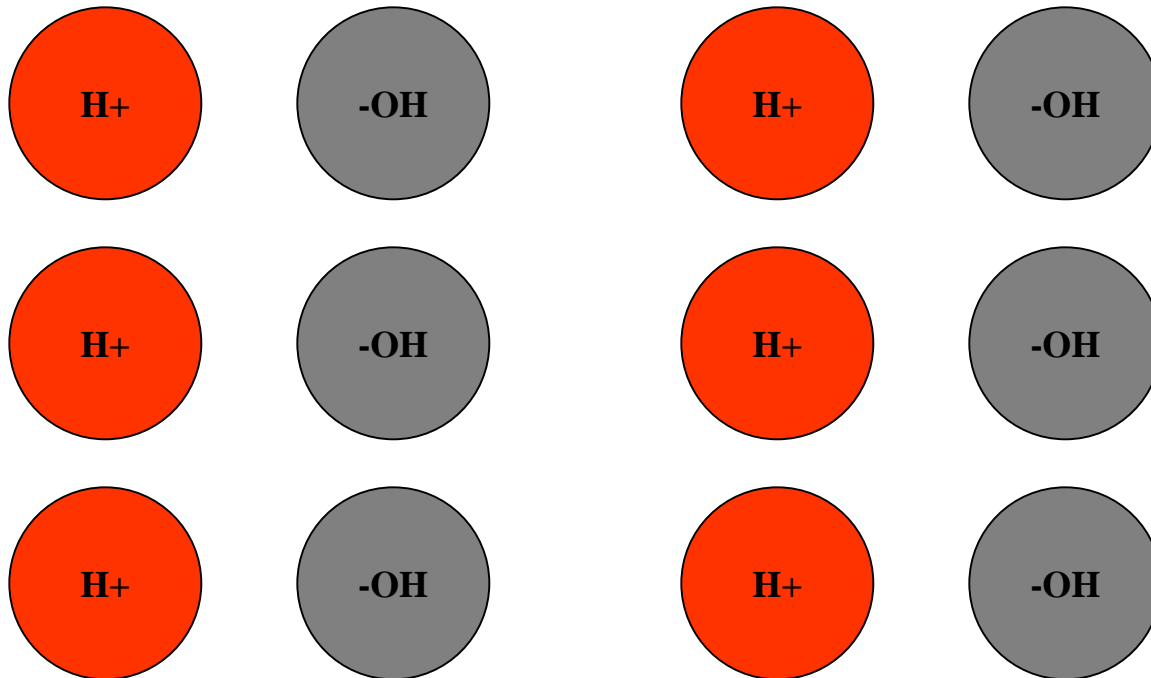




# AQUEOUS SOLUTION

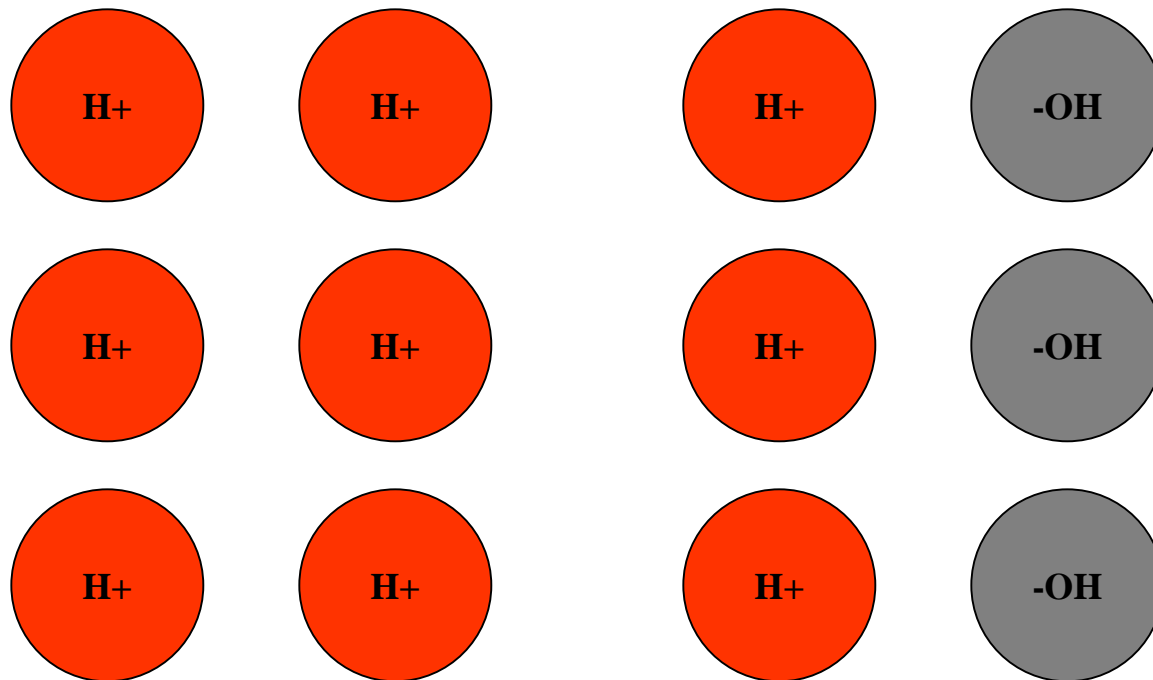
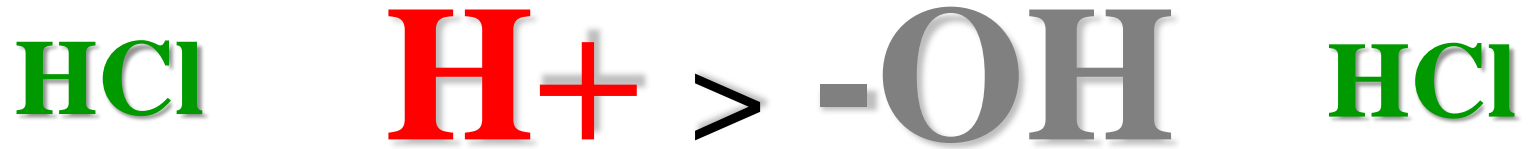


**H**





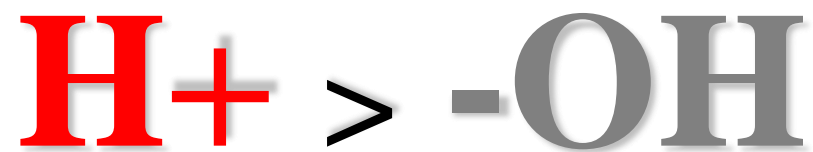
# AQUEOUS SOLUTION



AS



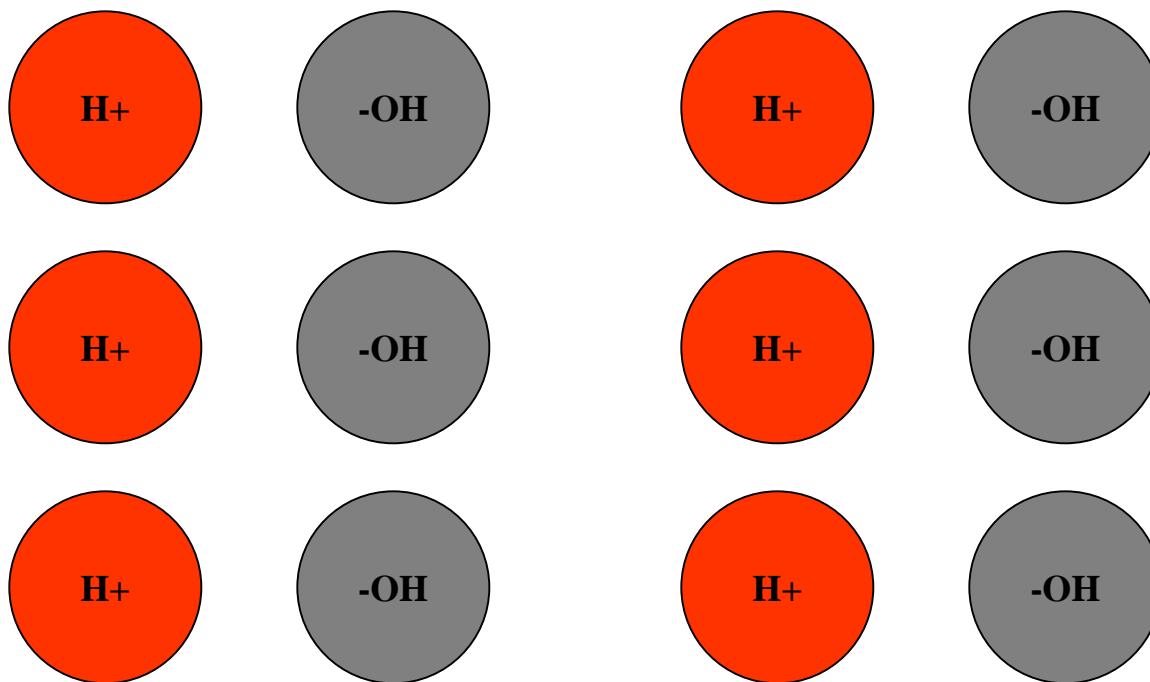
# AQUEOUS SOLUTION



**ACIDIC SOLUTION**



# AQUEOUS SOLUTION

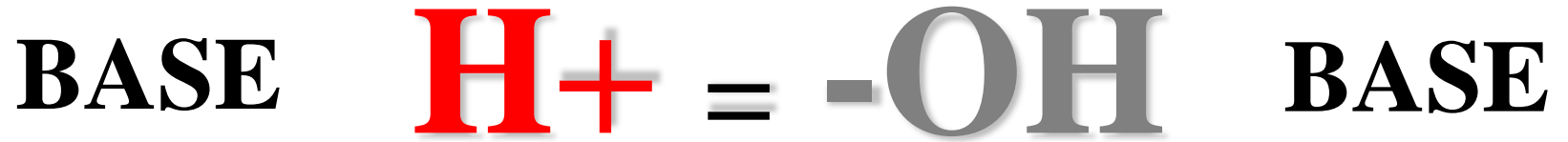


+

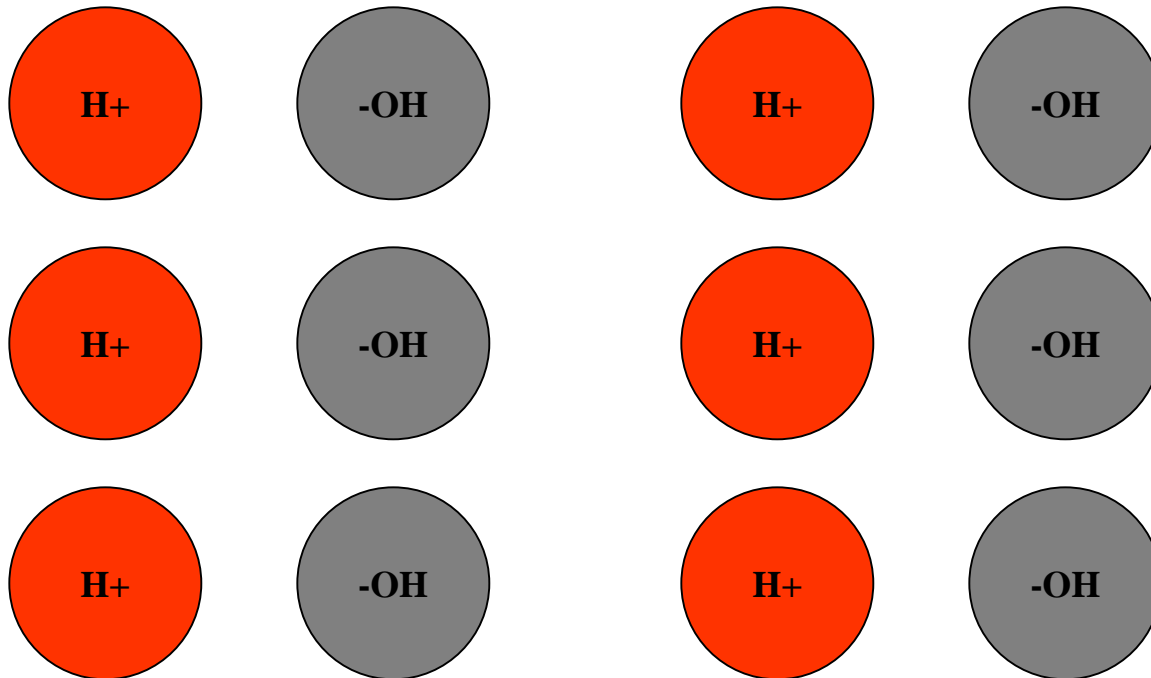
B



# AQUEOUS SOLUTION



Na

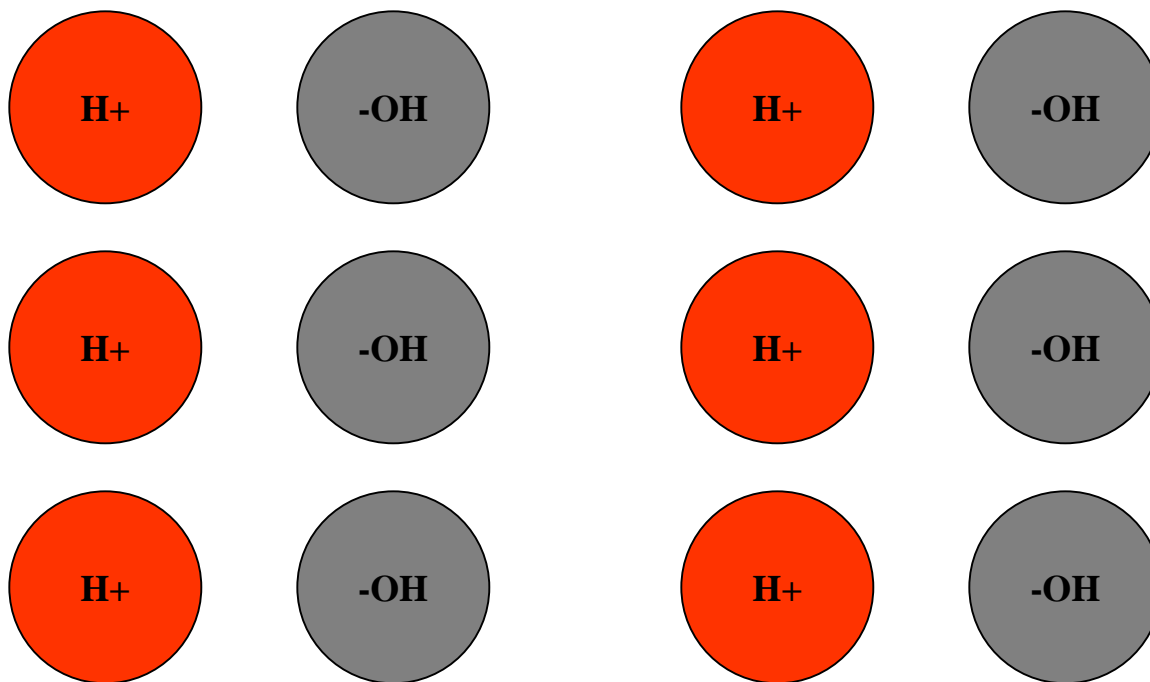




# AQUEOUS SOLUTION

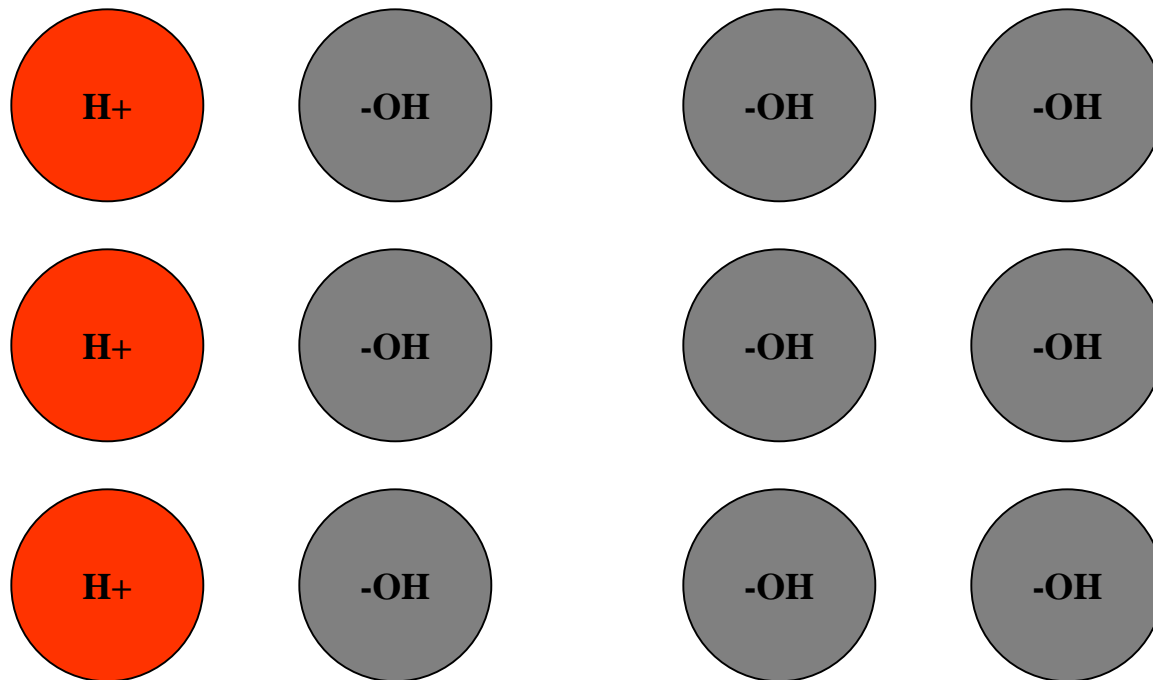
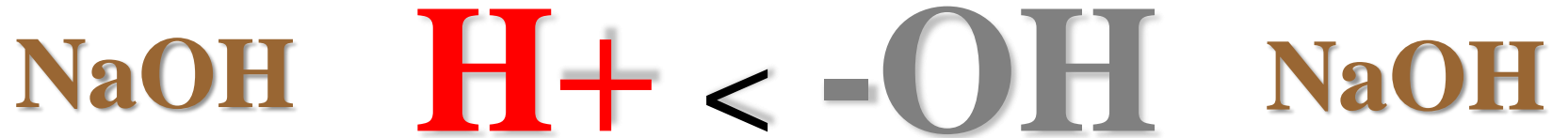


0





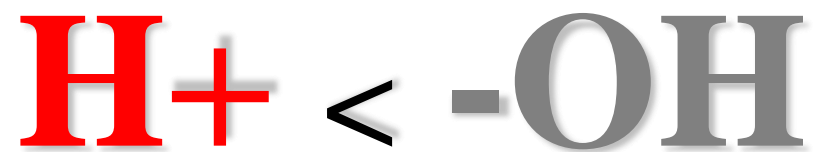
# AQUEOUS SOLUTION



BS

# AQUEOUS SOLUTION

?



BASIC SOLUTION

# QUESTION

HOW DO SCIENTISTS  
MEASURE THE RATIO OF  
H<sup>+</sup> IONS TO -OH IONS  
IN AN AQUEOUS SOLUTION?

# QUESTION



**ANSWER**

**pH SCALE**

**ANSWER**



# pH SCALE

# **pH SCALE**



# **pH SCALE**

**MEASURES  
AQUEOUS SOLUTION  
H<sup>+</sup>/<sup>-</sup>OH RATIO**

**pH SCALE**

# pH SCALE

#



# pH SCALE



# pH SCALE

A



**0-6**

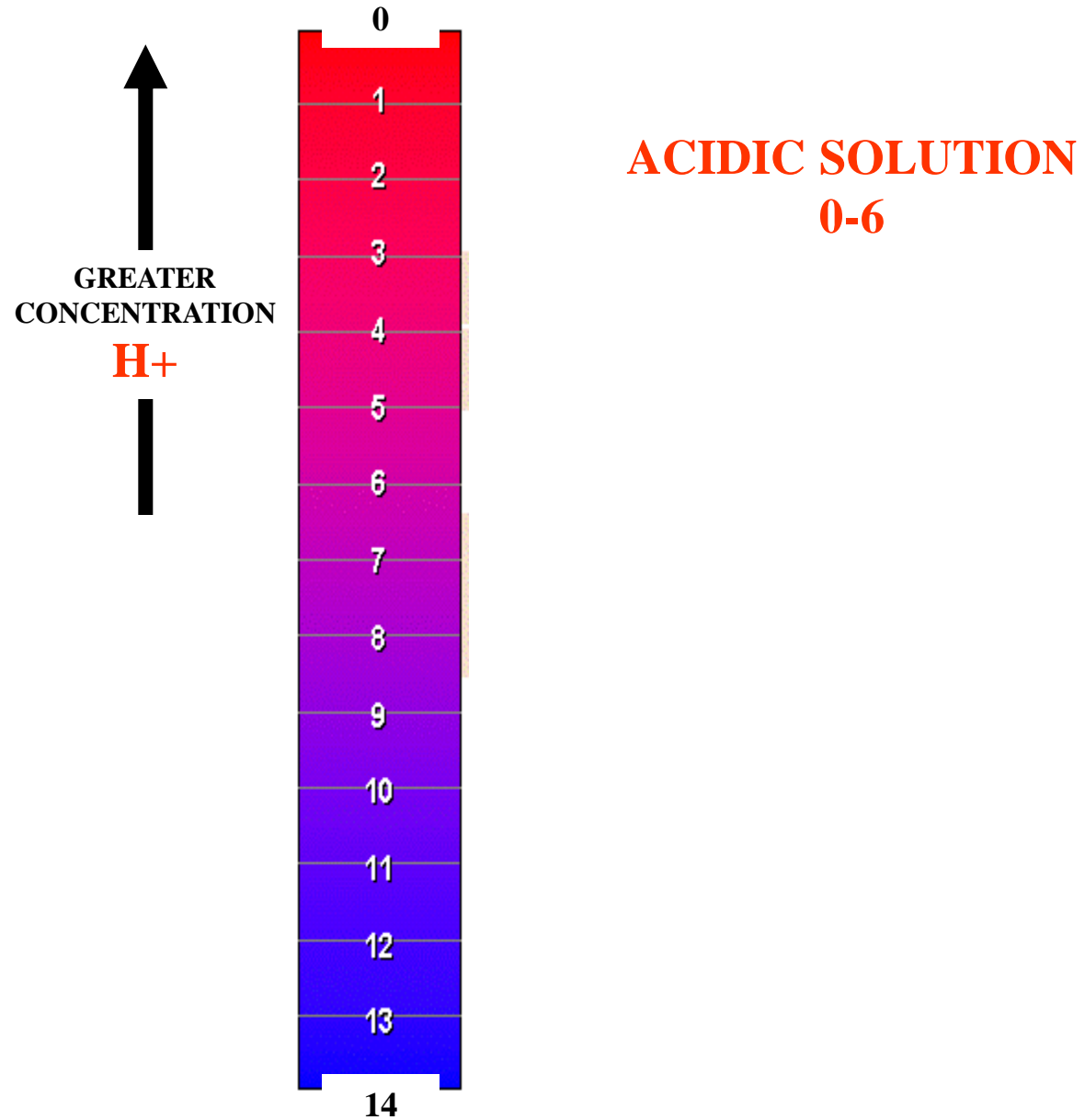
# pH SCALE

H<sup>+</sup>



**ACIDIC SOLUTION**  
**0-6**

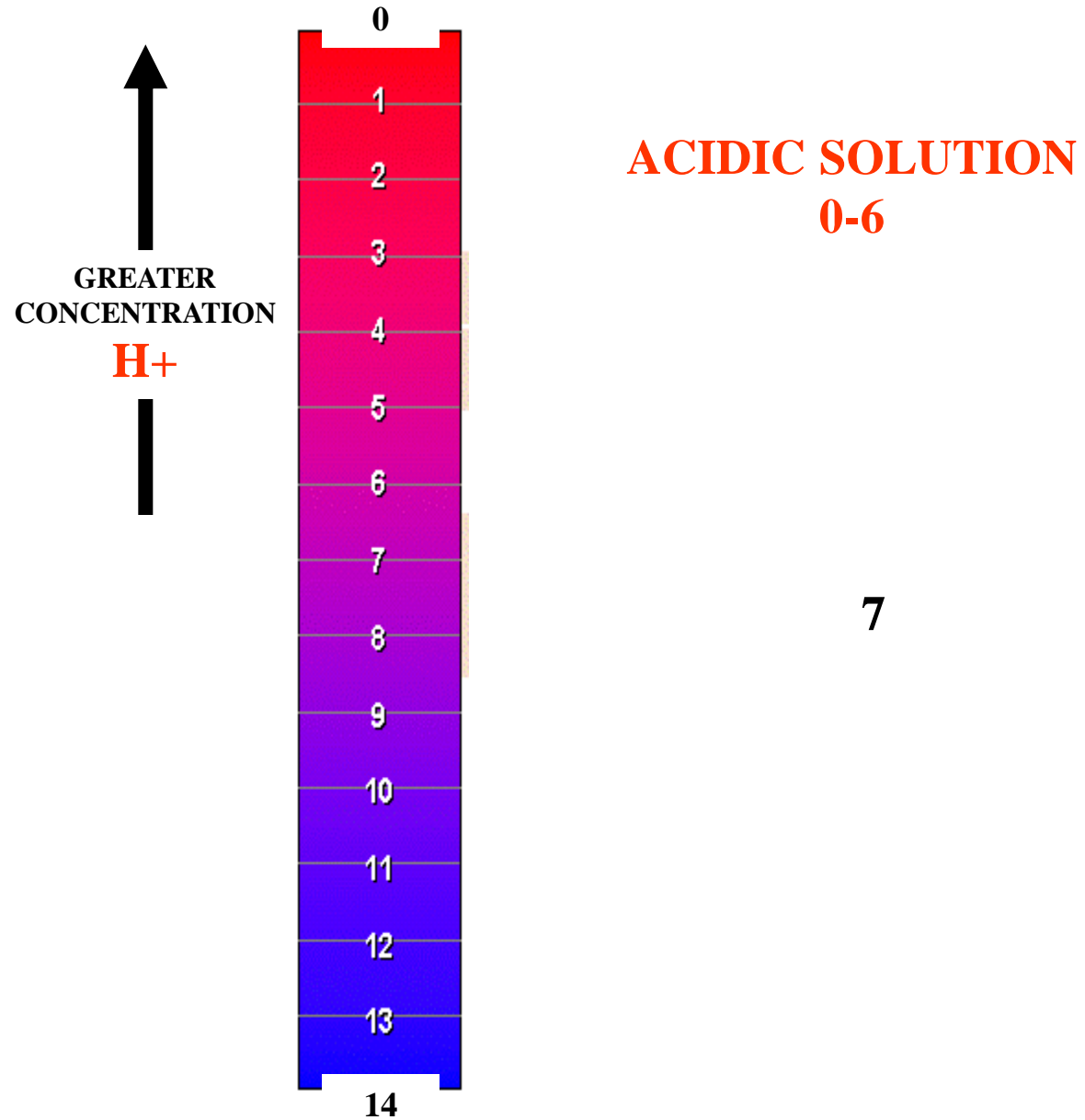
# pH SCALE





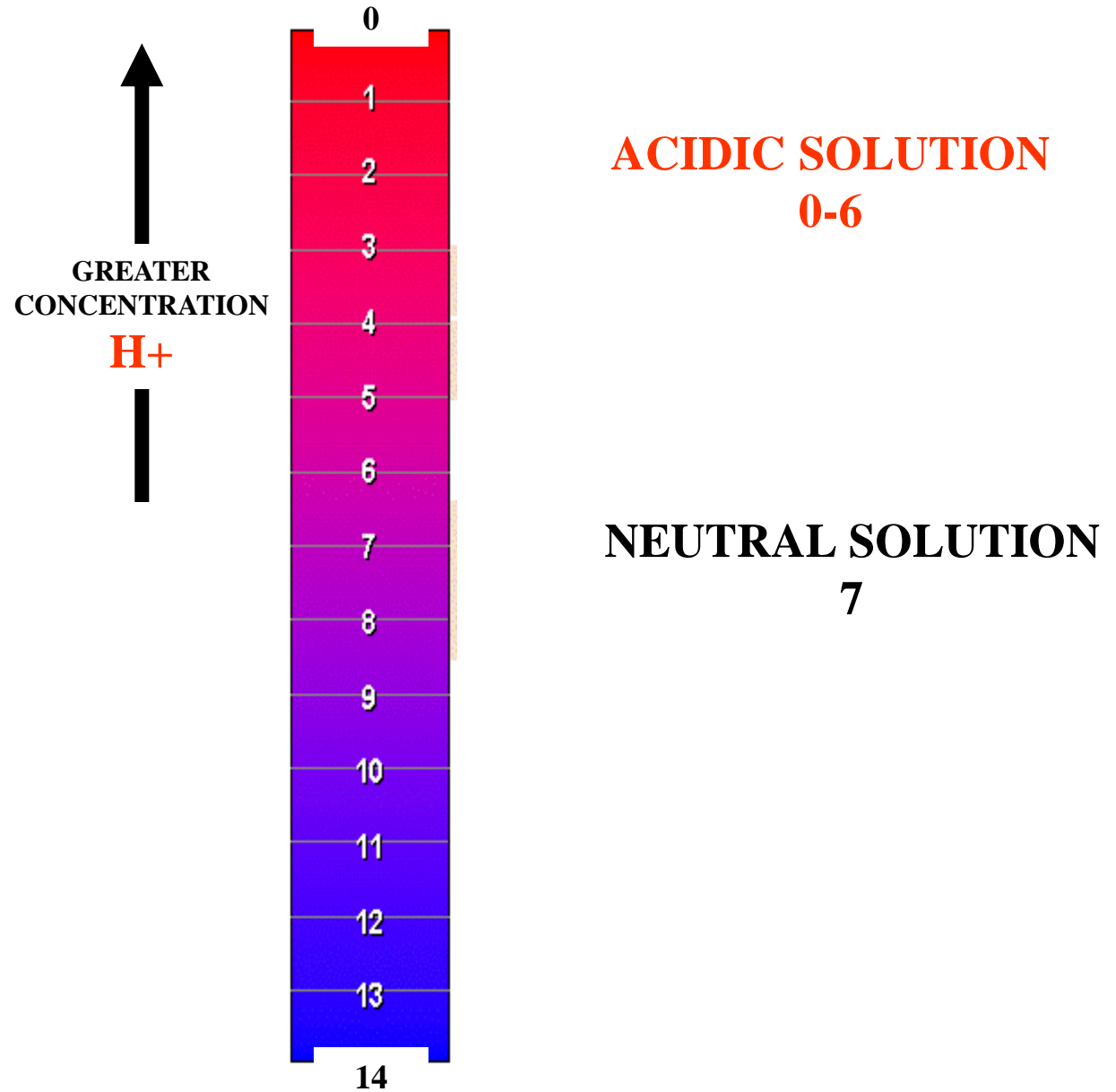
# pH SCALE

N

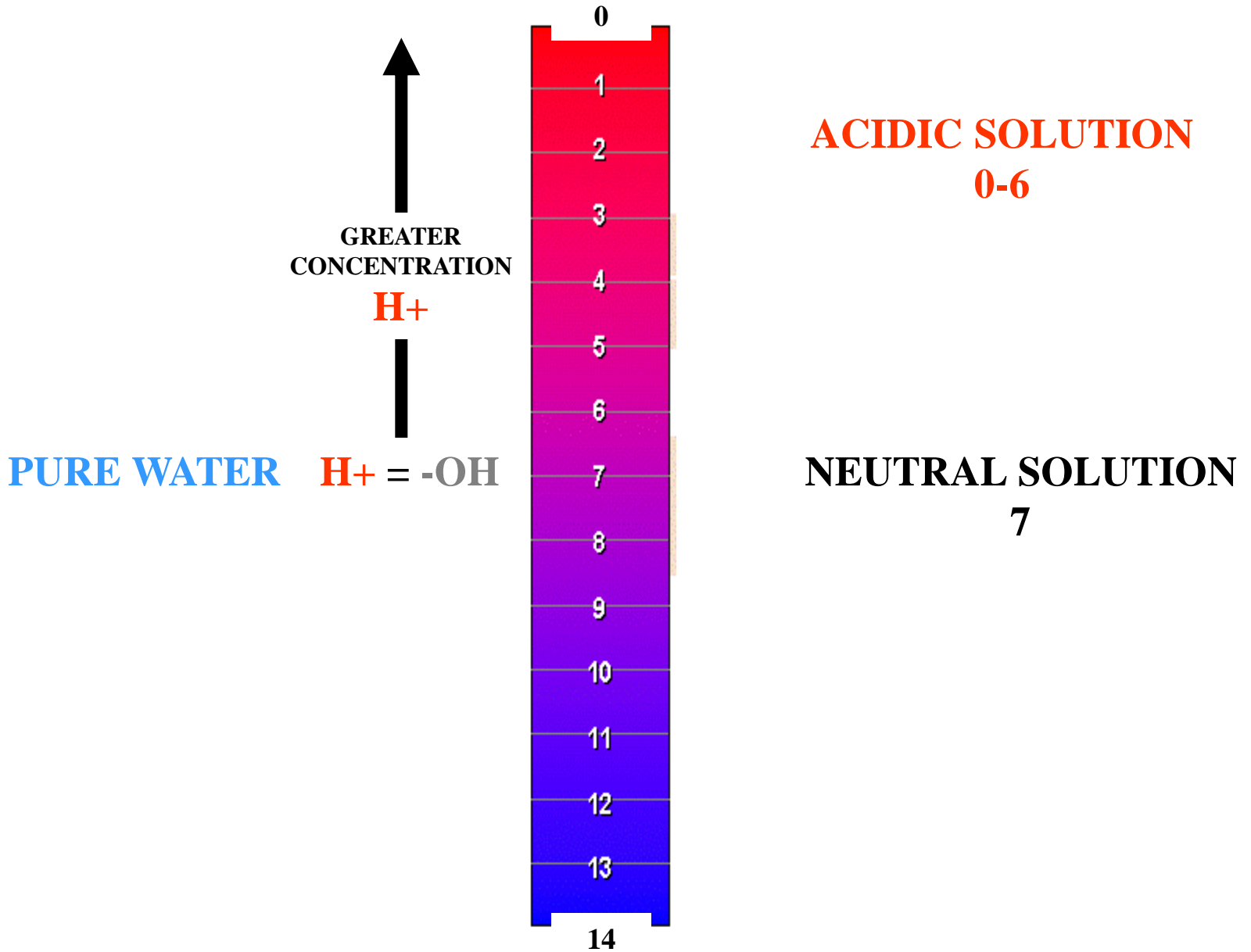


# pH SCALE

=

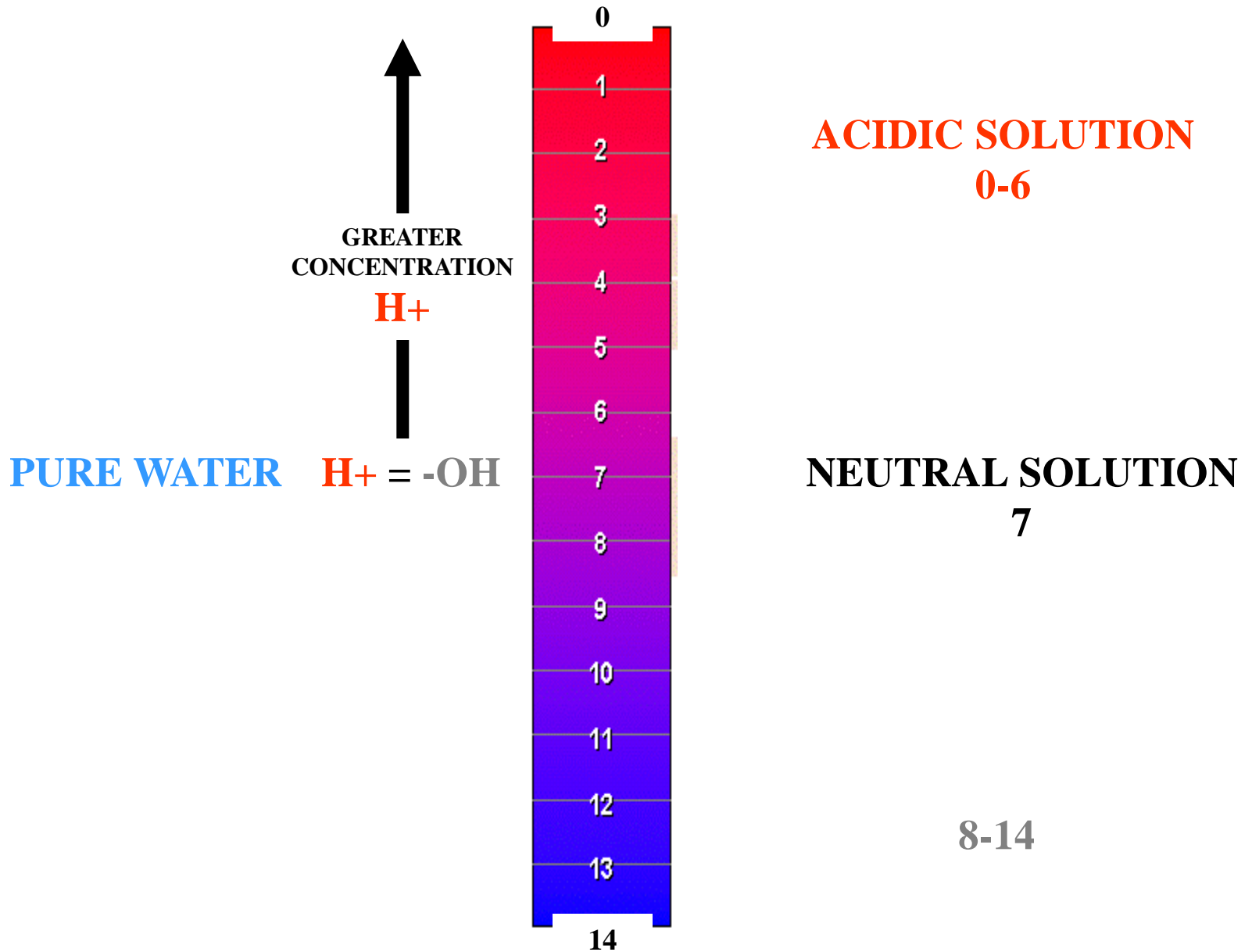


# pH SCALE



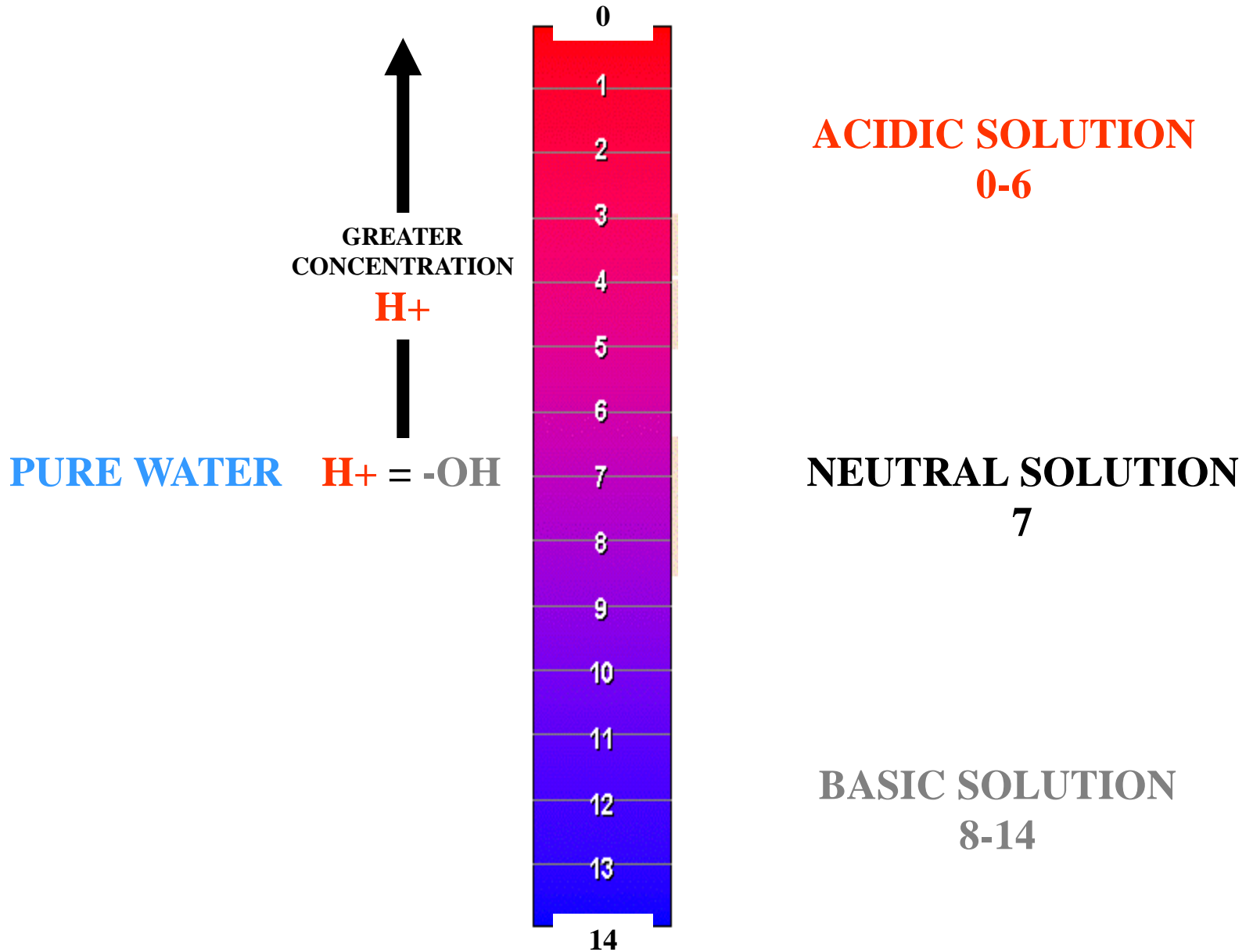
# pH SCALE

B



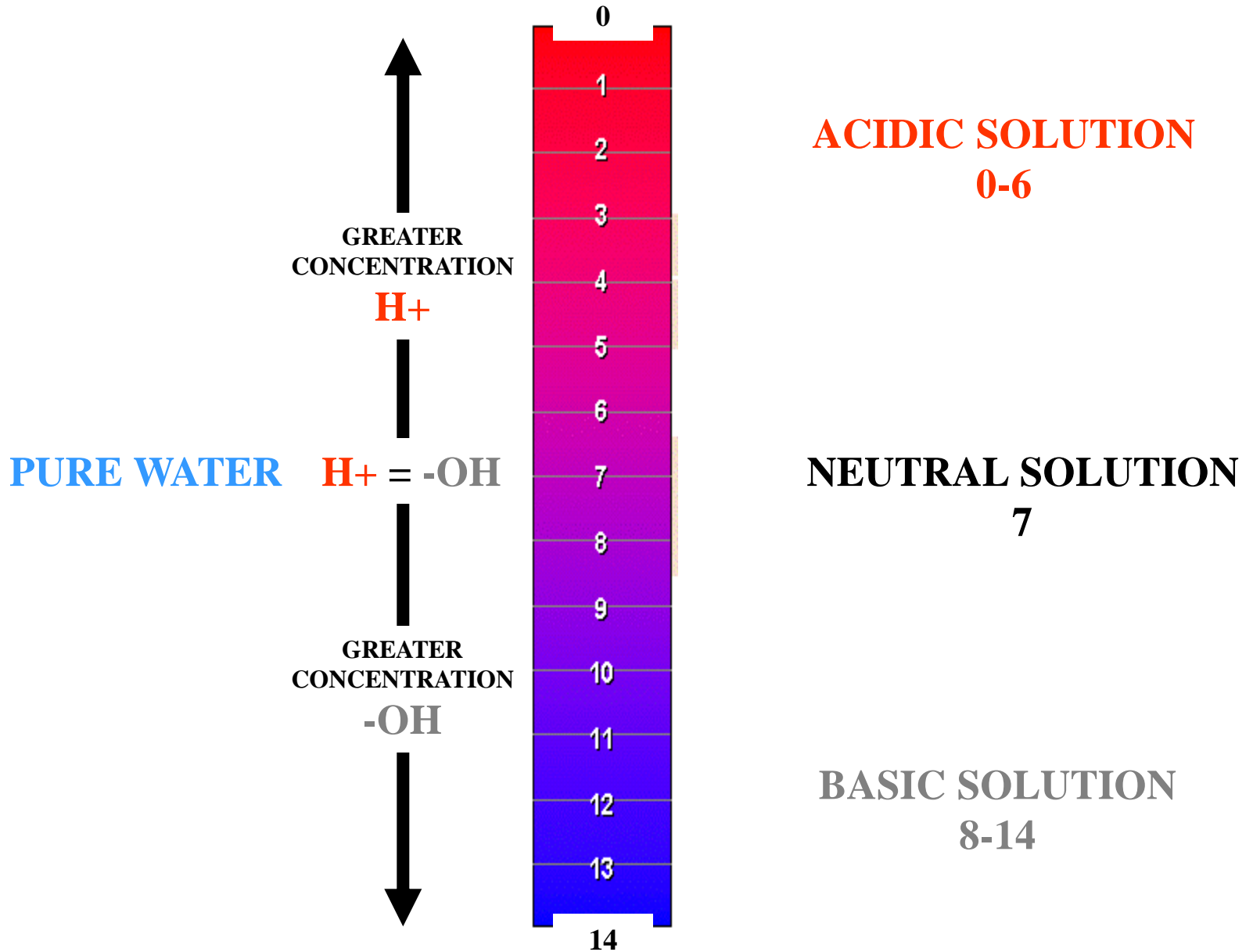
# pH SCALE

-OH

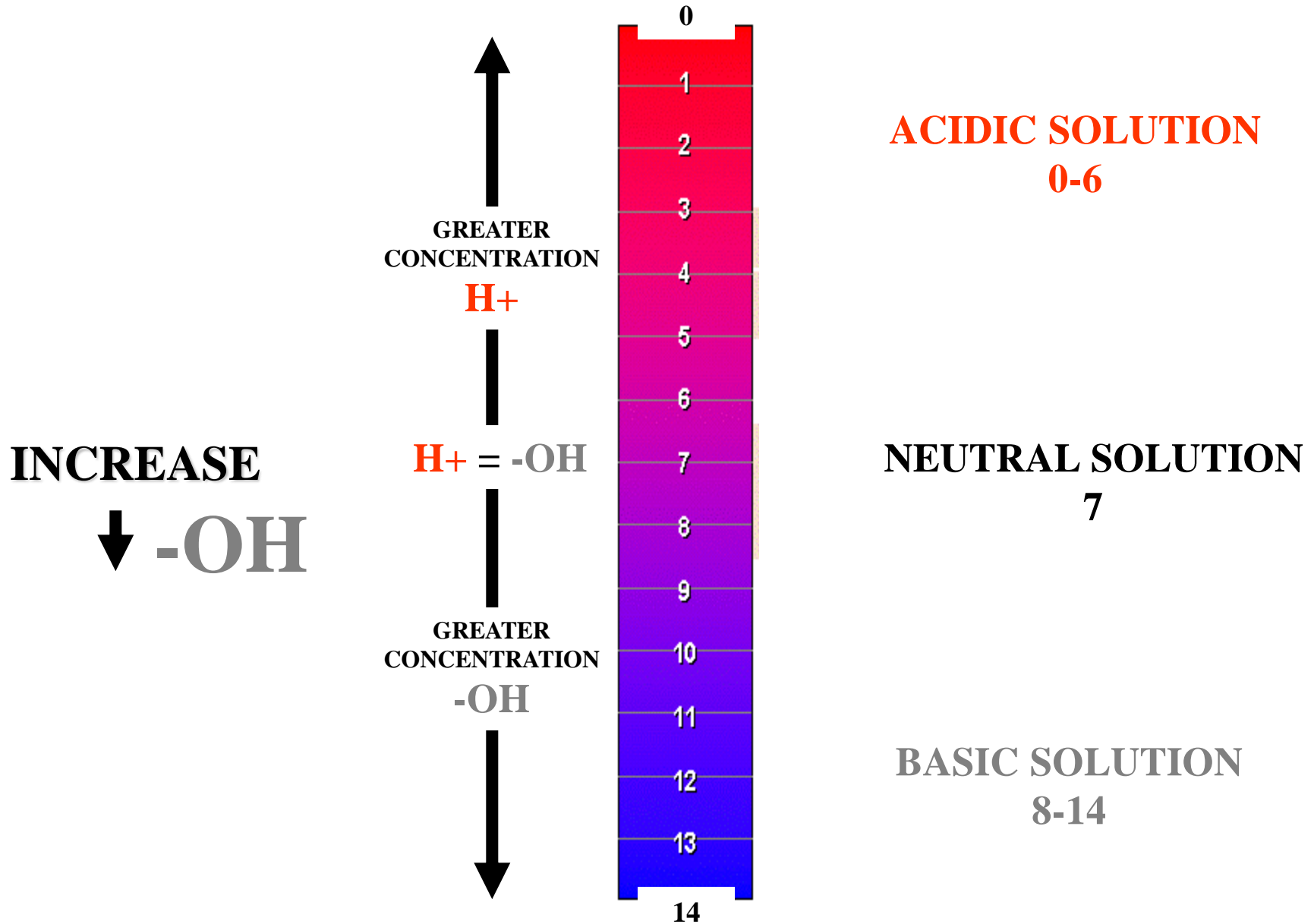


# pH SCALE

↓  
-OH



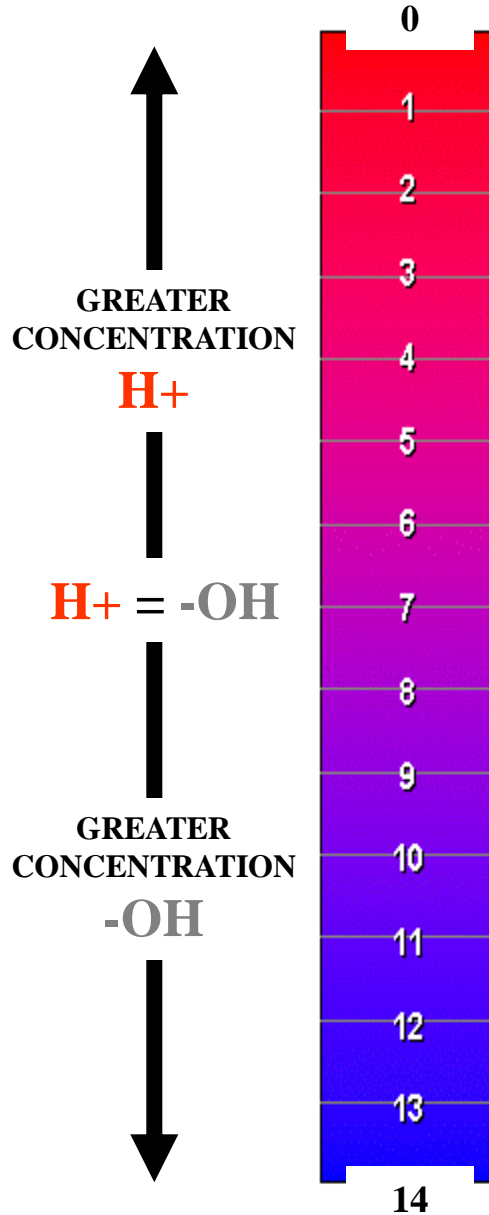
# pH SCALE



# pH SCALE



H<sup>+</sup>



**ACIDIC SOLUTION**  
0-6

**NEUTRAL SOLUTION**  
7

**BASIC SOLUTION**  
8-14

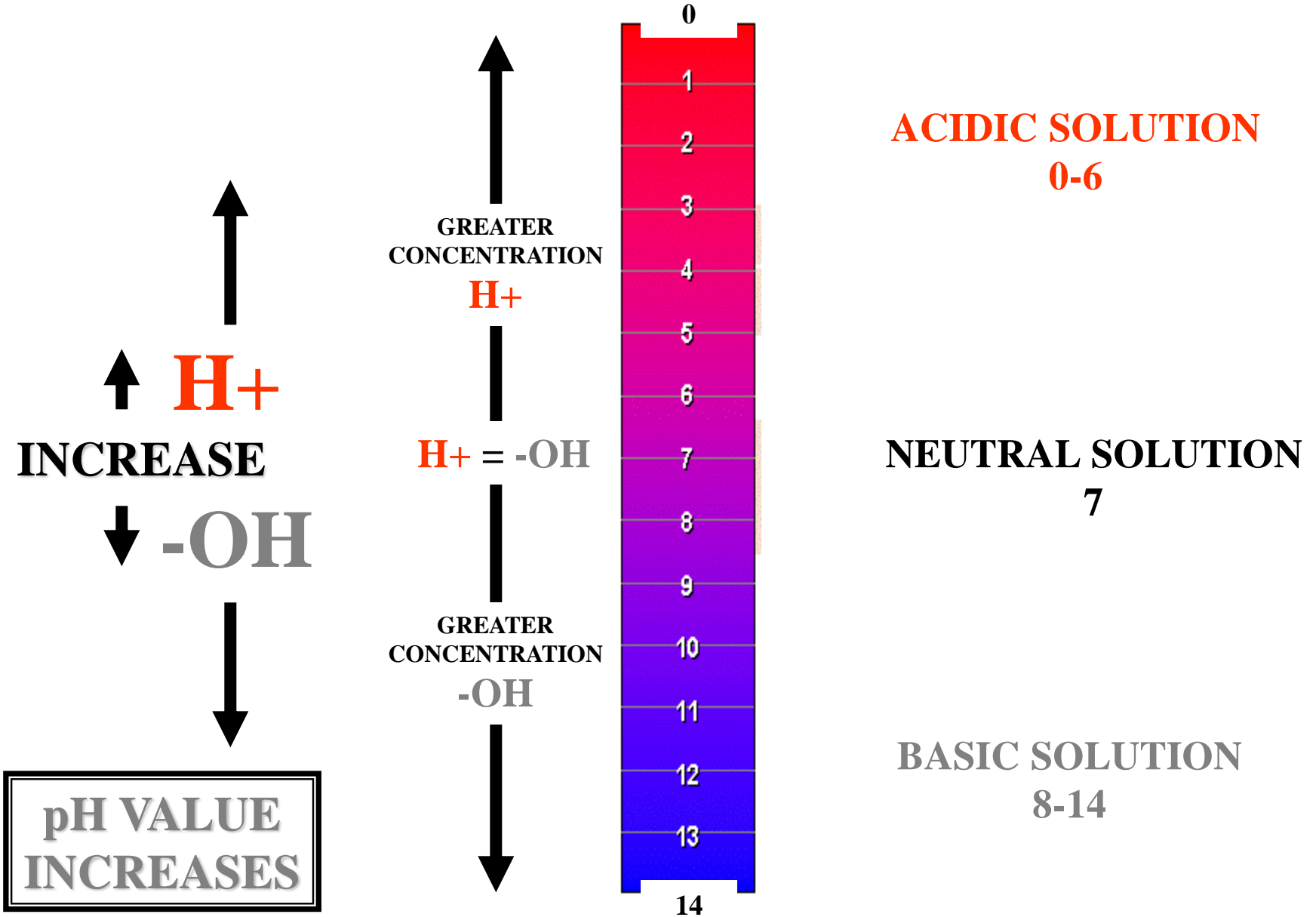
**INCREASE**  
↓ -OH



**pH VALUE  
INCREASES**



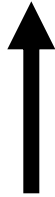
# pH SCALE





# pH SCALE

**pH VALUE  
DECREASES**



**↑ H<sup>+</sup>**

**INCREASE**

**↓ -OH**



**pH VALUE  
INCREASES**

**↑  
GREATER  
CONCENTRATION**

**H<sup>+</sup>**

**H<sup>+</sup> = -OH**

**↓  
GREATER  
CONCENTRATION**

**-OH**



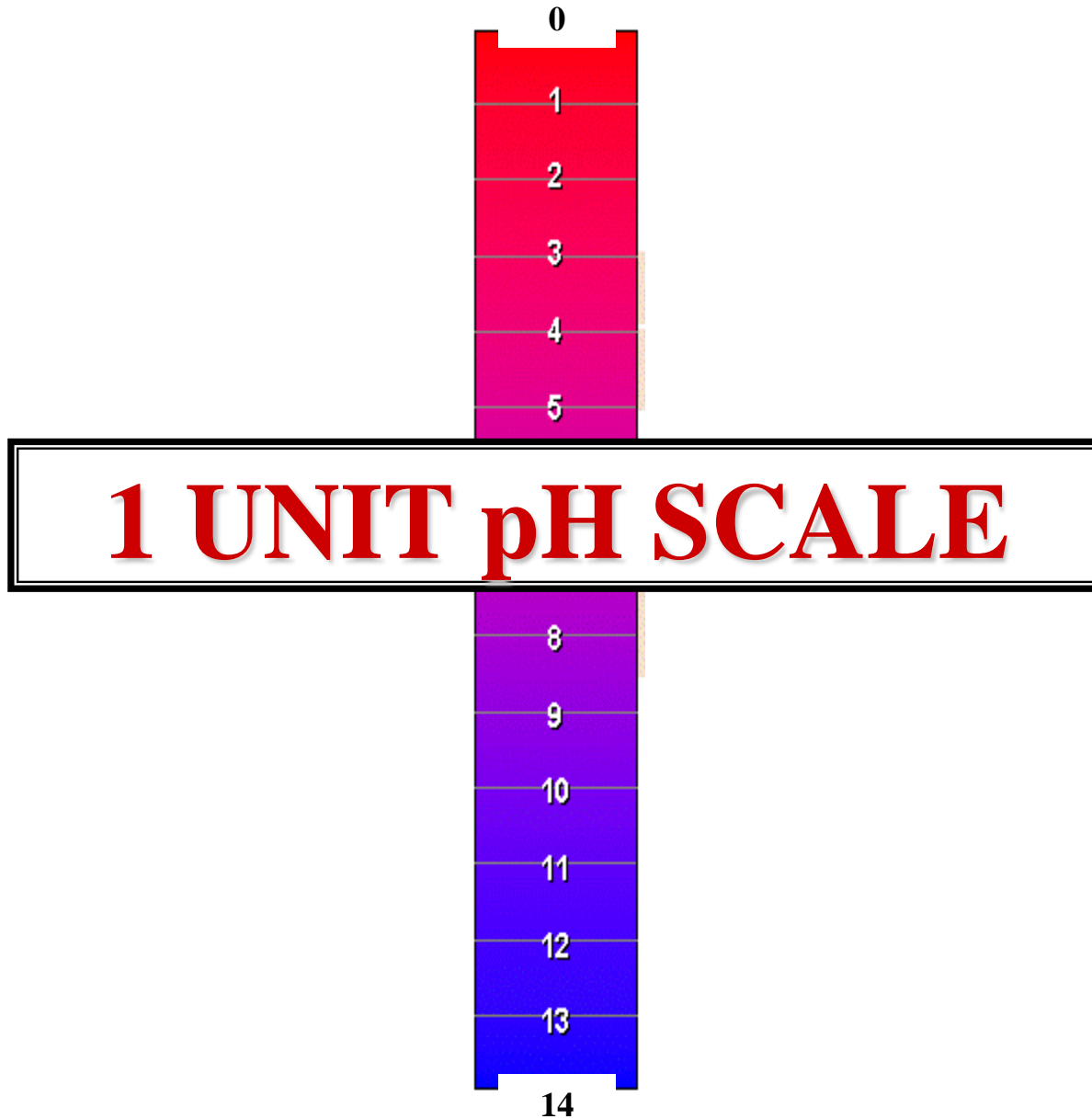
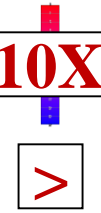
**ACIDIC SOLUTION  
0-6**

**NEUTRAL SOLUTION  
7**

**BASIC SOLUTION  
8-14**

# pH SCALE: UNITS

# pH SCALE UNITS



# pH SCALE UNITS



**1 UNIT pH SCALE  
10X ION  
CONCENTRATION  
CHANGE**





# pH SCALE

**1 UNIT = 10X ION CONCENTRATION CHANGE**

GENERAL PUBLIC



GENERAL PUBLIC



GENERAL PUBLIC



GENERAL PUBLIC



# pH SCALE

**1 UNIT = 10X ION CONCENTRATION CHANGE**

GENERAL PUBLIC



GENERAL PUBLIC

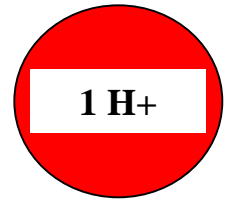
**pH = 5**

**pH = 6**

GENERAL PUBLIC



GENERAL PUBLIC

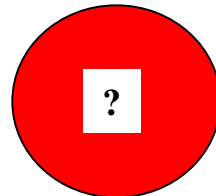


**pH = 7**

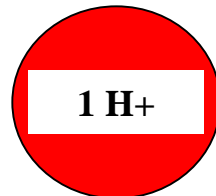
# pH SCALE

1 UNIT = 10X ION CONCENTRATION CHANGE

GENERAL PUBLIC



GENERAL PUBLIC



pH = 5

pH = 6

pH = 7

GENERAL PUBLIC



GENERAL PUBLIC



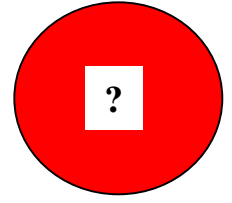
# pH SCALE

**1 UNIT = 10X ION CONCENTRATION CHANGE**

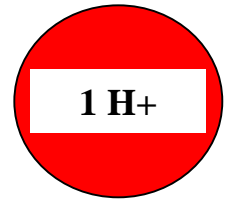
GENERAL PUBLIC



GENERAL PUBLIC



**10X ION CHANGE**



**pH = 5**

**pH = 6**

**pH = 7**

GENERAL PUBLIC



GENERAL PUBLIC

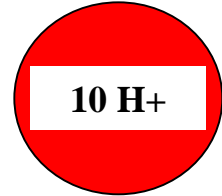
# pH SCALE

**1 UNIT = 10X ION CONCENTRATION CHANGE**

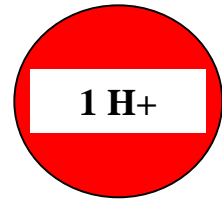
GENERAL PUBLIC



GENERAL PUBLIC



**10X ION CHANGE**



**pH = 5**

**pH = 6**

**pH = 7**

GENERAL PUBLIC

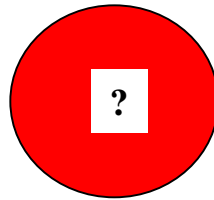


GENERAL PUBLIC

# pH SCALE

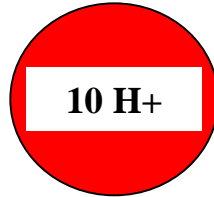
**1 UNIT = 10X ION CONCENTRATION CHANGE**

GENERAL PUBLIC



**pH = 5**

GENERAL PUBLIC

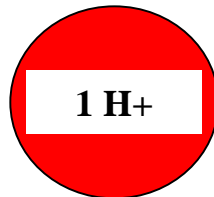


**pH = 6**

GENERAL PUBLIC

**10X ION CHANGE**

GENERAL PUBLIC

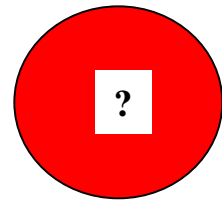


**pH = 7**

# pH SCALE

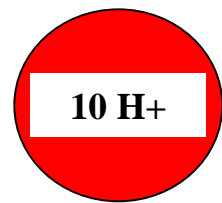
**1 UNIT = 10X ION CONCENTRATION CHANGE**

GENERAL PUBLIC



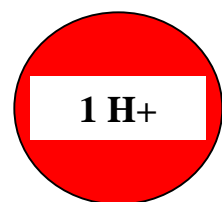
**pH = 5**

**10X ION CHANGE**



**pH = 6**

**10X ION CHANGE**



**pH = 7**

GENERAL PUBLIC



GENERAL PUBLIC

GENERAL PUBLIC





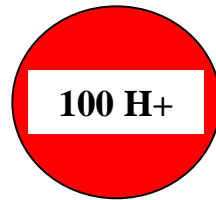
# pH SCALE

**1 UNIT = 10X ION CONCENTRATION CHANGE**

GENERAL PUBLIC

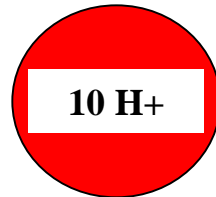


GENERAL PUBLIC



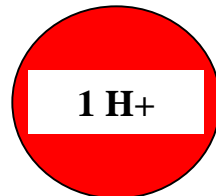
**pH = 5**

**10X ION CHANGE**



**pH = 6**

**10X ION CHANGE**



**pH = 7**

GENERAL PUBLIC

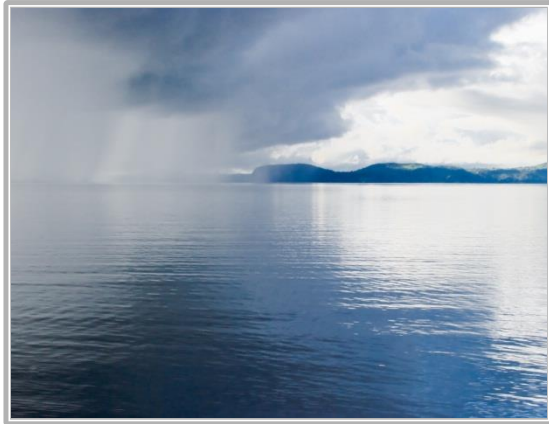


GENERAL PUBLIC

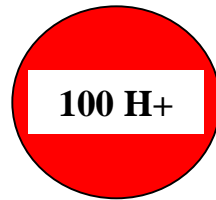
# pH SCALE

**1 UNIT = 10X ION CONCENTRATION CHANGE**

ACID RAIN

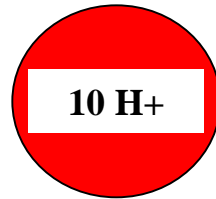


ACID RAIN



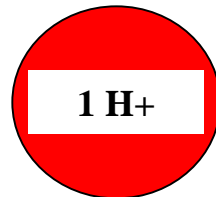
**pH = 5**

**10X ION CHANGE**



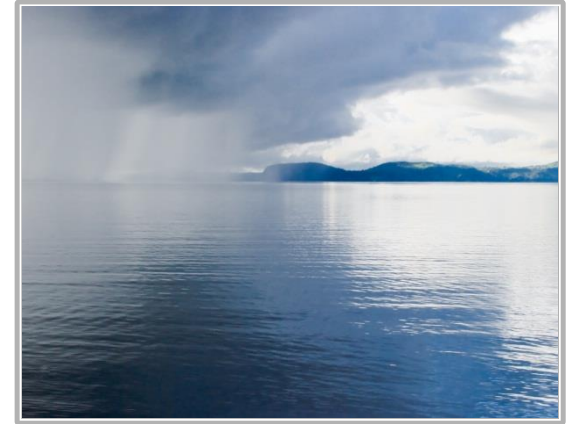
**pH = 6**

**10X ION CHANGE**



**pH = 7**

ACID RAIN



ACID RAIN



# ACID RAIN

# INDUSTRIAL POLLUTION CAUSES ACID RAIN



## THE ACID IN ACID RAIN

---

Sulfur dioxide reacts with **water** to form **sulfuric acid**.  
Oxides of nitrogen react with **water** to form **nitric acid**.  
Carbon dioxide reacts with **water** to form **carbonic acid**.  
Chlorine reacts with **water** to form **hydrochloric acid**.